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GENERAL STILWELL'S ATTEMPT TO SAVE BURMA

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Background

IN MARCH 1941, the Chinese Government asked for lend-lease arms on a scale appropriate to 30 divisions and for United States aid in building a road from India to China across North Burma. The arms were approved in early 1941, but aid for the road was not approved until January 1942.

Shortly after this, Lieutenant General Joseph W. Stilwell was sent to China with several missions, any of which would have tested the diplomacy of a Talleyrand and the martial skill of a Napoleon. Among these missions was the task of doing what he could about the unhappy situation in Burma.

As of General Stilwell's arrival in Chungking in March 1942, four Japanese regiments had occupied lower Burma and the port of Rangoon. Unknown to the Allies, the Japanese then reinforced their strength with the *18th* and *56th Divisions*, the third regiment of a division already there, and two tank regiments. Stilwell was given command of the Chinese Expeditionary Force in Burma, but in name only, for the dignitaries at Chungking continually by-passed and obstructed him. The supreme command in Burma was held by General Sir Harold R. L. G. Alexander, whom the Chinese accepted after long vacillation and then by-passed as they did Stilwell.

Stilwell tried to instill an aggressive spirit, tried to hold at Toungoo, but could not. He next tried to trap the Japanese at Pyinmana, but this plan came to nought when the Japanese *33d Division* trapped the 1st Burma Division at Yenangyuang, turning the Allied right flank. Stilwell sent a regiment of the Chinese 38th Division under General Sun Li-jen to rescue the 1st Burma Division. He called off the Pyinmana plan and began to deploy his forces to fall on the *33d Division* with three Chinese divisions, for he thought this a grand opportunity to take advantage of Japanese over-extension and to foil an ambitious Japanese plan he had correctly divined 10 days before. He was so engaged when bad news came from his left flank.

The Situation

In the account of the campaign so far, the two great corridors into Northern Burma have figured prominently. There are still other routes to the north, even

Although designated commander of the Chinese Expeditionary Force in Burma in 1942, General Stilwell soon found that he could exercise no control over the force, and his withdrawal to India became inevitable

though these are not so obviously attractive to an invader. These are the many tracks and the principal road north through the Shan States. Here, the Chinese Sixth Army (General Kan Li-chu), was deployed, with the Temporary-55th Division (1st, 2d, 3d Regiments) along the Mawchi-Htuchaung-Bawlake-Loikaw Road, the 49th Division at Mongpan, and the 93d Division at Kengtung.

As yet, there had been only border skirmishes, though on occasion they made screaming headlines in the American press. This Chinese army had contributed nothing to the campaign in Central Burma, despite attempts by Stilwell to use the Temporary-55th at Toungoo. What held the army in the Shan States was the belief that there were some 50,000 Siamese and Japanese troops in Northern Siam, including two Japanese divisions. Actually, the only major Japanese unit in the whole of Indo-China and Siam was the *21st Division*, at Hanoi, French Indo-China. In early 1942, the Japanese were content to hold those countries with small garrison forces.

The British liaison officer with the Chinese Sixth Army invited Kan's attention to the scattered state of his divisions and the absence of a central reserve. The matter bogged down in administrative formalities, Kan saying that higher authority had made the dispositions which he could not change. When Kan agreed that the matter should be referred to Burma Army Headquarters, that body replied no Japanese threat was anticipated. This was an unfortunate state of affairs because the T-55th was the principal obstacle to the revised Japanese plan for the encirclement and annihilation of Burma's defenders. Since a Chinese document taken at Toungoo said the principal Chinese forces would seek a decisive engagement south of Mandalay, the Japanese decided to launch their final drive from a line through Loikaw, Yamethin, and Yenangyuang.

Japanese Plan

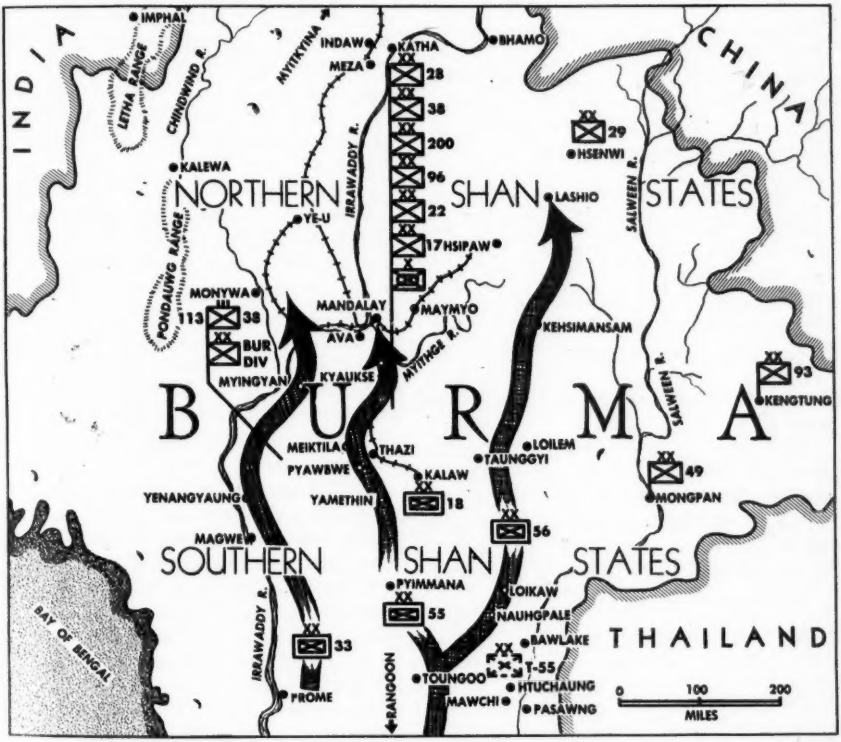
The revised Japanese *Fifteenth Army* operational plan, issued at Toungoo 3 April 1942, called for the use of all of its divisions, directing the *56th* to swing east from Toungoo on Lashio, the *18th* and *55th* on the east and west suburbs of Mandalay respectively, and the *33d* up along the Irrawaddy's banks, sending one element to the Mandalay plain and another to Bhamo. For its mission, the *56th Division* was heavily reinforced with the *14th Tank Regiment* and two battalions of artillery, and it was made mobile by the attachment of ample motor transport. If weather permitted, airborne troops would seize Lashio.

When the Chinese company garrisoning Mawchi was driven out during the first week in April, the encircling Japanese column moved on in its attempt to cut the Burma Road and force on Burma's defenders the alternatives of surrender or flight through the jungles and mountains. At first, there was no great concern felt; the Japanese force seemed small. The Japanese then moved east to Nammehek and to Htuchaung, defeating the Chinese 1st Regiment, which was ordered to fall back to Bawlake and reorganize.

At Stilwell's headquarters, his G-2, Colonel Frank N. Roberts, had for some days been concerned over his inability to locate the third regiments of the Japanese *33d* and *55th Divisions*. When the Chinese reported this series of contacts on the east flank of the Allies' central concentration, Roberts was alarmed. Because of the pressure under which Stilwell was then working, Roberts had to raise the issue at mess, suggesting that this was one of the missing regiments and that its goal was Lashio. Stilwell immediately appreciated the menace, and he called a conference with Tu and their staffs on the 9th.

"The estimate of the Japanese strength and plans was that Japs would advance in 3 columns from West to East: Prome—Magwe; Toungoo—Pyinmana; and Baw-

lake—Taunggyi, with Mandalay as their objective; flank columns to provide double pincers." This was a completely accurate appraisal of the Japanese plan. To counter it, the Chinese 93d Division, less one regiment, would close in on the T-55th by moving to Taunggyi. The 49th, plus one regiment of the 93d, would continue to watch the Siamese border. The Sixty-sixth Army would mass below Mandalay as rapidly as



possible, and the Pyinmana plan would go on as before.

Attempt to Concentrate

Orders for the concentration were put into the cumbrous and unwieldy Chinese staff machine, and on 11 April Stilwell visited the Chinese Sixth Army front, where it was now known a major blow would fall. After Stilwell's visit there, the Sixth Army commander was reprimanded by General Lo Cho-ying, Stilwell's executive, and Stilwell recommended a general court martial for the commander of the T-55th Division. Unfortunately, *The Stilwell Papers* does not say why. It may have been for the insubordination of Toungoo, though that was not on the scale of General Tu Li-ming's efforts, or it may have been for the state of the T-55th, which was untrained, poorly organized and disciplined, and strung out along the road in bivouac areas with no preparation for defense. American Volunteer Group aircraft

and pilots were brought up for an attempt at reconnaissance.

When the movement orders finally were delivered on the 13th, the 93d Division would not obey them, and it was supported in this by Kan, both insisting that trucks be furnished. Trucks were so few, and the drivers so terrified of the Chinese, that 30 days would be needed to move the division a distance it could march in 8. Area Headquarters for the Southern Shan States was unhelpful, refusing to give troop movements priority over back-loading rations until General Sir Harold Alexander's headquarters approved. Subsequent negotiations were complicated by the diversion of trucks by still other Chinese authorities.

Compounding the failure, Stilwell's headquarters and his liaison officers were unaware that the 93d Division was not moving. The resolution of these orders and negotiations was that two of the 93d's battalions were in the Loikaw area on the 20th, and one regiment was about 20 miles from Loilem shortly after the 22d, too late to counter the Japanese thrust. The 49th Division was not ordered west until the 20th.

While these attempts were being made to bring aid to the T-55th, its 1st Regiment, withdrawing northward, was again defeated by the Japanese at Pasawng, while the 2d Regiment, which had been moving south, was taking up "defensive positions" on the Htuchuang.

Here came a brief pause in which the T-55th was content to remain passive in its bivouacs along the road. Chinese troops along the road from Bawlake to Loikaw suffered severely from thirst and the energetic British liaison mission with the Sixth Army tried to run down truckloads of fresh water. This ended when the Chinese promptly confiscated the trucks. Colonels Frederick McCabe and Harry S. Aldrich, Stilwell's liaison team with the Sixth Army, pleaded with Kan to counterattack, or at least to patrol aggressively, but with no success, and a strange sort of truce settled on the battlefield.

Attack on the Chinese

The Japanese put this inactivity to good advantage. While the T-55th lolled in bivouac, the Japanese sent company after company toiling through the woods parallel to the road on which the Chinese camped. A frontal attack on the Htuchaung 16 April was followed on the 17th by attacks from the flanking companies along 40 miles of road from the Htuchaung to Maungpale. By morning of the 19th, one Japanese element was a few miles south of Loikaw, and it was joined in an hour by a battalion which had marched diagonally across the mountains from Toungoo.

Under these attacks from front, side, and rear, the T-55th simply disintegrated, its soldiers fleeing to the hills. The two battalions of the 93d Division, the first part of the long-awaited reinforcements from the east, turned about and returned whence they had come. The road to Lashio was open to the exultant Japanese. Communication between the T-55th and the Sixth Army ceased on the night of the 18th, and it was clear that the division was no longer a fighting unit.

The collapse of the T-55th and the failure to stem the Japanese in the Irrawaddy forced the complete recasting of Allied plans, and one last attempt was made to save Northern Burma. Stilwell's immediate reaction was to order the 200th Division to Taunggyi to attack the Japanese in the Loikaw—Loilem area. This forced the abandonment of the attempt to hit the Japanese *33d Division* at Yenangyuang. A concentration of the 49th and 93d Divisions on the T-55th had already been ordered. In the Sittang Valley, the Chinese 96th Division was ordered to delay the Japanese for 1 week. The 17th Indian Division was now falling back on Meiktila.

Concentration at Mandalay

Three days later, on the 25th, a confer-

ence between Alexander, Stilwell, Lo, and Lieutenant General William J. Slim laid plans for a concentration of Chinese and Imperial forces before Mandalay, a Chinese concentration before Lashio, and for the motorized Chinese 200th Division to sweep up behind the Japanese task force that was racing for Lashio. This accorded well with Stilwell's earlier orders, and was based on them.

The Mandalay concentration was successfully completed. The 96th Division continued in the delaying role earlier intended to cover the counterattack at Yenangyuang, and held back the Japanese while the 17th Indian Division, 7th Armored Brigade, and Chinese 22d Division took positions around Meiktila and Thazi. In so doing, the 96th was reduced to 1,500 men in a series of actions climaxed when Japanese tanks caught the whole division on the road 24 April. From Meiktila and the Thazi—Kalaw—Pyawbwe triangle north to the Myitnge River, the several brigades of the 17th Indian Division, the 22d Division, and a regiment of the Chinese 38th Division with invaluable assistance from the 7th Armored Brigade, covered one another in a series of leapfrogging movements, under pressure from both the *18th* and *55th Divisions*.

To the east, four Chinese divisions were maneuvering, and to the south the Chinese Fifth Army Command (200th Division plus) was on its way to Taunggyi. Two of the four (49th, 93d) had been in the Shan States when the first attempts to keep the Japanese from Lashio were being made. The 93d, as noted earlier, began its march west after some delay, but on learning of the defeats in the west it turned about and returned to Kengtung. The 49th was sent west on the 20th from its post 90 miles from Taunggyi and moved so fast that on the 21st one regiment was in action between Mongpawn and Loilem, where it took casualties without affecting later events in any way.

On the 23d, the Sixth Army's commander forbade the now-assembled 49th to attack and ordered it withdrawn. At the time, this was not known to Stilwell or Lo. Of the three divisions of the Chinese Sixty-sixth Army (38th, 29th, 28th) then entering Burma, the 38th had already been in combat and done very well. The 29th was marching in down the Burma Road, and its leading regiment entered Lashio 29 April, the day the city fell. The 28th Division was in the Mandalay area, and on the 22d it was directed to move by rail to Hsipaw and south from there to Loilem. Unfortunately, the move to Hsipaw was halted by administrative confusion on the Burma Railway. Further confusion was caused by General Lin Wei, head of the Chinese Military Mission, who ordered it to Lashio on the 28th, countermanding the earlier order. On the night of 28-29 April, the 28th had one regiment across the roads south from Hsipaw and Lashio, one on the Lashio—Hsipaw road, and one marching from Maymyo to Hsipaw.

Thus, of the nine Chinese divisions in Burma, several took very little part in the operations culminating in the fall of Lashio. But at the time, this was not reported to Stilwell and Lo, who accordingly could not intervene and complete the concentration to defend Lashio. One reason for the failure to move divisions was that Stilwell could not get lend-lease trucks from the Chinese authorities in Lashio with which to move Chinese troops. Asked to provide 150 trucks of the 850 then in Lashio, they sent 22.

Colonel Haydon L. Boatner called on the American Volunteer Group to help stem the Japanese rush to Lashio. In response, they flew strafing missions on the 24th and 25th, burning a number of gasoline trucks caught on the road near Loilem, and attacking a convoy at Kehsimansam. Through an error of General Lin Wei's, they also strafed Chinese troops.

Generals Stilwell and Lo were with the

200th Division when it was rushed from the Meiktila area to retake Taunggyi. For this operation, the 1st and 2d Reserve Regiments were attached; the task force was designated "Fifth Army Command" and placed under General Tu. The critical importance of speed had been stressed, but when the Fifth Army Command encountered the Japanese outposts near Taunggyi it promptly halted. These were the security detachments of the Taunggyi garrison, one Japanese battalion.

On arriving next morning at 1030, Stilwell found the Fifth Army Command still halted, and he ordered an immediate attack. Contact was made with a few more Japanese at 1130. By late afternoon, a little more distance had been gained, whereupon Lo ordered Tu to take Taunggyi that day or suffer the consequences, with a reward of 50,000 rupees to the troops if the town fell. On the afternoon of the 25th, Taunggyi was finally taken from its small Japanese garrison. Gathering momentum, the 200th took Hopong and reached Loilem on the 29th. From that area it later began its retreat to China.

Fall of Lashio

Lashio, goal of the Japanese drive, fell in the early afternoon of the 29th to the *148th Regiment* after a 5-hour battle. Another Japanese regiment quickly followed into the city. Colonel Boatner tried to slow the Japanese by destroying the bridges to the south, two Chinese battalions made a stand across the roads below Lashio, but these efforts only gained a few hours. Boatner and his British colleagues had destroyed what they could, but the Japanese gained 44,000 tons of arsenal stores, some of which was still to be seen 3 years later. As many women and children as possible were flown out.

Below Mandalay, the Irrawaddy River flows east and west, and only the Ava Bridge was suitable for tanks. To the Allied forces crowded against the River, this situation must have seemed uncomfortably like that on the Sittang a few months before. So on the 25th, after a conference with Stilwell, Alexander ordered a withdrawal to the north bank of the Irrawaddy, to begin that night. On the same day, tanks and trucks of the Fifth Army could be seen moving north through Lashio to China, passing troops of the Sixty-sixth Army stolidly moving into Burma. The evacuation of the Fifth Army was without Stilwell's orders, and was the beginning of the collapse that rendered futile any hopes of holding Myitkyina and the trace of the Ledo Road.

On the 26th, Alexander decided that the fall of Lashio would be a matter of days and would probably make any stand north of Mandalay futile, that the defense of India would have to be his major concern. At a conference of the 29th between Alexander, Stilwell, and Lo, Alexander decided to hold the line: Kalewa—Katha—Bhamo—Hsenwi; failing that, to move the bulk of his troops to India. The Fifth Army with the 22d and 38th Divisions would delay along the Mandalay—Myitkyina railway, while the 96th would go directly to Myitkyina. When and if necessary, Alexander would move his headquarters to Myitkyina as well.

It was Stilwell's intention at the time to make his next stand there, so he wrote in his diary 30 April: "Our crowd direct to Myitkyina." He himself planned to go to Loiwing to direct the fight to keep some sort of communications open to China. To the War Department, he reported that the campaign seemed to be over and asked if he should establish himself next in India or China. The withdrawal to the north of the Irrawaddy was covered in its initial stages by the 48th Indian Brigade at Kyaukse. Skillful use of artillery and armor held off elements of the *18th Division* in a well-fought action, and the Japanese were kept below the Myitnge River until the bridges were blown. There was

no Japanese pressure on the 63d Indian Brigade and the Chinese 22d Division along the river line, but it was felt that they could not withstand a heavy attack, and so they were withdrawn across the Irrawaddy the night of 30 April. The great Ava Bridge was destroyed at midnight, and Central Burma was now firmly held by the Japanese.

The general withdrawal to the line indicated by Alexander on the 29th was ordered for 2 May. The Chinese forces in the eastern half of Burma were already in full movement back to the Salween River, whose mighty gorge was the natural defense line of Southwestern China. Stilwell's and Alexander's hopes of a stand across North Burma began to vanish as the Chinese streamed out of the country. The aircraft that was to take Stilwell to Eastern Burma failed to arrive on time, and Loiwing, his intended destination, was evacuated that same day.

Withdrawal to India

Gradually, Stilwell concluded that he could exercise no control over the Chinese armies, and that evacuation of his headquarters was his next problem. Nevertheless, as of 5 May he still intended to go to Myitkyina. On the 4th, he had learned that the railway was blocked, so he took his party along the Katha Road to Meza, 18 miles from Indaw, on 5 May. He and his aides then went on to Indaw to ask about the railway situation, only to learn that it was blocked north and south of Indaw. Because Japanese were reported at Bhamo, within easy striking distance of Myitkyina, Stilwell decided then and there on the 5th not to attempt to make his way by car to Myitkyina but instead to take his party due west to India, as it would be impossible to reach Myitkyina before the Japanese (who occupied it 8 May).

In marching out to the west, Stilwell could make arrangements for the reception in India of his Chinese troops. Stilwell, Lo, and Alexander agreed on the 30th that if the plan to hold the line Kalewa—Katha—Bhamo—Hsenwi failed, the Fifth Army troops, plus the 22d, 38th, and 96th Divisions, would march from Katha to Imphal. This would put some 100,000 Chinese in India, after they had been brought up to strength with replacements and after supporting troops had been organized. Stilwell would then give them proper training and equipment for an attack into Burma.

Reflecting the views of Lieutenant General Hugh A. Drum, whose papers Stilwell had studied in Washington 2 months before, it was a logical development of a project suggested a few weeks before by a Chinese general. Placed at once before the Chinese government and the War Department, this scheme called for marching 100,000 Chinese to India and training them there with the lend-lease diverted from Burma to safer parts. The 30 April understanding that the Chinese would march out to India should now have been in effect, but orders from Generalissimo Chiang Kai Shek, sent the 96th and 22d Divisions to wandering through Northern Burma.

The War Department approved Stilwell's withdrawing in the direction of India on the assumption it was related to his training plan. Indeed, Stilwell's conduct of the whole campaign received the approval of the American and Chinese Governments. On 18 April, he received the formal commendation of the Secretary of War, and warm, personal greetings came from Marshall on the 29th when the campaign was nearing its dismal close. Madam Chiang sent a long cable to Lauchlin Currie, President Roosevelt's personal representative to China, saying the Generalissimo had "entire confidence" in Stilwell. In a Cabinet session, Mr. Roosevelt "expressed great satisfaction over Stilwell's handling of the whole situation," and told him so on 12 May.

The Importance of Research and Development to National Security

Dr. Benjamin H. Williams
Member of the Faculty, Industrial College of the Armed Forces

THE emphasis on research and development and the rise of research institutions are frequently correlated with national danger. The Royal Society in Great Britain, which was formed in the reign of Charles II and is the oldest general scientific society, had, among other aims, a military purpose, that of aiding the English in their naval rivalry with the Dutch. In this country, during the Civil War, the National Academy of Sciences was created. At the time of World War I, the National Research Council was added. And in World War II, the Office of Scientific Research and Development became an important instrument for winning the victory. The relationship between research and development and national security has, therefore, long been known. But the scale of effort and the speed of progress have increased to such an extent as to give this relationship today an entirely new meaning.

Expenditures

The revolutionary change in attitude toward research and development in governmental and military circles, and the greatly increased understanding of the importance of these activities to national security, may be shown by a few budgetary facts. In 1930, only 14 percent of the public and private budget for research and development in this country was spent by the government. In 1947, the governmental portion of the national bill was 56 percent. That the increase in governmental participation from 14 to 56 percent was largely due to the motive of national security may be inferred from the further fact that 80 percent of the government's expenditure in 1947 was made by the military services. The rising emphasis on science and technology in governmental circles is almost breathtaking when the increase in the amounts spent is considered. In 1930, the research and development expenditures of the Federal Government totaled 23 million dollars. As compared with this, the 1941-1945 annual average was 500 million dollars, not counting the greatest scientific technological project in history, the development of the atomic bomb. This was a war period. But in 1947, a year of peace, the government expended 625 million dollars, again not counting the cost of atomic energy projects. In 17 years, the amounts in the national budget were multiplied more than 27 times.

The expansion of the government's activities reveals the rapidly growing concern felt for the attainment of national security through research and development in a period in which this country has been sucked into the vortex of world politics. It also is something of an index of the increased ability to administer these

matters as systematic activities. Functions of research and development were once left mainly to the initiative of individuals—the college professor and the lone inventor in his attic or basement. Now, organized and cooperative research and development are the order of the day. And the magic of the laboratory has come to affect the life and death of nations to such an extent that the government, acting mainly through the military forces, exercises the dominant influence and provides the major support on a scale that was not even dreamed of previous to World War II.

Perhaps the accomplishments of modern technology can be explained in terms of social developments—the growing capacity of western societies to fit ten thousand minute specializations into one gigantic enterprise and to administer that enterprise as a whole and for a unified purpose.

The research and development—national security relationship has long been known; but the scale of effort and the speed of progress have so increased that this relationship now has an entirely new significance

Certainly, nothing as complicated as the Manhattan Project, coordinating the work of so many scientists and engineers, could have been directed cohesively in a former century. No matter how the fundamental explanation is phrased, the fact is that research and development activities have been greater and the wizardry of machines and chemicals has quickened more rapidly in our time than in any previous period of history. We are in an accelerating trend, the line of which is not a straight ascending slant but a curve that is turning upward.

The Pace of Technology

Dr. Hornell Hart, a sociologist and student of cultural change, has discerned much more clearly than most contemporaries just how rapidly the pace of technology is increasing. He points out that the fastest speed of travel, which during the greater part of human existence has been that of the man on foot (about 10 miles per hour), reached a new plateau with the domestication of the horse about 15,000 B. C. From then until the coming of the railway, the horse furnished the speediest means of conveyance, and the best record of horse racing was not over 35 miles per hour. By the beginning of the twentieth century, the speed of the horse had been greatly surpassed by that of the railway locomotive which could travel at 120 miles per hour. As mechanical inventions progressed rapidly, this phenomenal increase was quickly overshadowed by the accomplishments of the airplane. The fastest standardized fighter planes are now approaching 700 miles per hour, while experimental planes have surpassed the speed of sound (about 740 miles per hour) by an unknown margin. The history of transportation by slow foot travel, and then by the horse, the locomotive, and the airplane, represents a million years during most of which there was practically no change at all. By far the greatest increase in speed has come during the final minute portion of that period, i.e., in the last few decades.

The same type of acceleration that is seen in the rate of transportation is found in the lengthening of distances over which a projectile can be hurled. In 1900, after centuries of experience with explosives, the distance at which a projectile from a cannon could be fired was a little over 6 miles. By World War II, the range of the most highpowered of orthodox artillery was five times this figure. A new type

of projectile, the guided missile, had, however, traveled over ranges of well above 200 miles. Vast increases in this distance are blue-printed and well within the possibility of attainment. If the delivery of bombs by airplane should be counted as the hurling of a projectile, a radius of over 4,000 miles has already been reached by the B-36.

The greatest recent technological acceleration of all is seen in the increase in the power of explosives. From the introduction of gunpowder in warfare in the western world until the year 1945, a period of some 6 centuries, the destructivity of explosives had increased, according to Dr. Hart, 3.2 times. And then in 1945 came the atomic bomb, thousands of times more destructive than the most powerful pre-atomic explosives. Certainly, the human mind is too ineffective to grasp these recent whirlwind advances and far too feeble to relate them to the rest of knowledge. But the attempt has to be made, particularly by military planners, and they must at the same time try to make some kind of allowance for those changes which they know in all probability are being brought about even as they conduct their planning.

Research and Development

The stages of research and development, despite necessary overlapping, may be fairly well defined for the purpose of analysis. The essential prerequisite is basic research which is study and investigation carried on for the purpose of gaining new knowledge and understanding. Facts are uncovered and the relations between facts are perceived. In the perception of relationships not observed before, it may be that new and valuable principles will be propounded which then become part of the tools of man to be used in the attempt to master his natural environment. Basic research is concerned with general knowledge and understanding and not with the creation of a specific device or process. Its findings have universal application.

The beginning of a specific project takes place when in some fertile mind an idea for practical change assumes form. Or it may arise from an organized attack on a problem by a group of investigators who have been set to work when the need for some kind of change has become obvious. The severe criticism of a product by a disappointed user, the news of a scientific discovery opening up new possibilities, or the wiping out of a detachment of men by superior enemy equipment, may show the necessity of change and stimulate specific ideas.

After an idea for a new device has been accepted, there comes the practical task of determining just what it must accomplish in order to achieve its purpose, that is, what its "characteristics" are to be. The planning of the 76-mm antitank gun and carriage illustrates both the origin of a specific idea and the determination of military characteristics for one type of new weapon. About the time of Pearl Harbor, the Tank Destroyer Command was set up to devise battle tactics and matériel to oppose the German system of tank attack that had played such havoc with the French armies. The Command was given troops and many thousands of acres on which to conduct its experiments. It was decided that an enemy breakthrough could not be prevented but that an effort should be made to engulf and destroy it with fast mobile artillery before it could ruin our behind-the-line transport and communications. Based on the tactics of mobile fire power thus planned, a swift self-propelled gun was devised. Some of the chief characteristics of the new weapon were:

1. Power to penetrate tank armor.
2. A speed of 50 miles per hour.
3. Ability to travel in any difficult ground over which a tank could move.

In the development of the gun, these characteristics were met. A 76-mm gun, which had just been created by the Ordnance Department, and which possessed sufficient fire power for the purpose, was used. The motorized gun carriage achieved a speed of 55 miles per hour, and it was capable of moving much faster than a heavy tank over any ground traversable by the tank. When produced, this weapon was an effective tank destroyer and was much sought after. Later it was replaced by the 90-mm gun.

Proximity Fuse

In the earlier phases of the creation of a new device or process, there often remains much applied research to be done. Applied research consists of study, investigation, and experimentation to determine the best methods by which a specific device or process may be developed. Thus, when the Navy became interested in working out the idea of a proximity fuse prior to Pearl Harbor, many research problems in the creation of a practical design remained to be solved. It was not known which type of proximity fuse could be most effective, whether it would be the radio or acoustic fuse or some other type. The task of investigation was in 1940 turned over to Section T of the National Defense Research Committee. The staff spent much time at the beginning in eliminating ideas which, after some experimentation, were found to be impractical for quick development.

The radio fuse was soon decided upon, but many questions remained. How, for example, could a fuse be developed which would be sufficiently sensitive to explode on proximity and yet sufficiently rugged to withstand the shock of the initial velocity and rotating movement of a shell? A great deal of experimentation was conducted at the Carnegie Institute of Washington on fuses for shells and at the Bureau of Standards on fuses for bombs and rockets. Various types of electrical components, such as vacuum tubes, plates, and dry batteries, were tested. Enclosed in steel containers, they were dropped from towers or fired from guns. The effects of this treatment were carefully noted. Ultimately, such experimentation furnished the data on which successful models were constructed, and the fuses produced devastating effects in the European and Pacific theaters.

Development, as the term is applied in this connection, is the experimental engineering work which attempts to put the idea for a new device in the form of a model or, in case of the development of a new process, seeks to demonstrate its practicability. The model often is built up from a small layout, intended to demonstrate a principle, to a full-scale prototype which incorporates the characteristics agreed upon. Before the development stage is ended, it is normally required that the prototype must operate to the satisfaction of the agency or department which expects to produce it or supervise its production or, in the Department of Defense, the using agency.

In the Armed Forces, after the prototype has been accepted, a limited number may be produced so that they may be tested under service conditions. In 1943, a new radar mechanism for blind bombing, H2X, was developed by the Radiation Laboratory at the Massachusetts Institute of Technology. Twenty sets were produced for trial. These instruments proved successful in bombing raids over Wilhelmshaven, bombs being dropped on the target through a thick overcast. After the service tests proved satisfactory, H2X was widely used and became a valuable accessory to air operations in Europe and the Pacific. Changes in the prototype are sometimes made following the tests.

When the development is completed, it is frequently necessary for the product to

be re-designed so that it will fit in better with the processes of mass production. The design engineer, familiar with the requirements of assembly line techniques, takes over the work of the experimental and developmental engineer. At this point, the work of research and development passes into production.

Future Needs

The need for emphasis on research and development becomes clear when one attempts to envision another major war. It is quite probable that such a war would impose upon the Armed Forces of this country a mission so stupendous that it could not be performed with the technology now available without incurring terrible, perhaps unbearable, losses. It is more than likely that such a war would require powerful blows to be delivered at an enemy stronger, more distant, and more inaccessible than any we have yet encountered. With countries which are more populous and have a higher birthrate than the United States, it would be suicidal folly to trade man for man or even one man for two or three. It will, therefore, be essential, should another war come, that this country be prepared in advance with such advantages in technology as will permit victory without catastrophic losses. Europeans who first settled America were able to overcome the resistance of the American Indians because of greatly superior technological and cultural strength. The prospect that the United States might find itself involved in another major war imposes upon us the necessity of seeking to achieve a similar technological margin over our opponents.

If one should assume that such a war is to occur, the present becomes a time of great importance, since the research and development part of the conflict is being fought out at this moment. The basic research, as well as much of the applied research which gave this country great advantages in World War II, had already been completed before Pearl Harbor. It may well be set down as an axiom that, so long as wars are to occur, the research and development phase in economic mobilization will go on in peacetime. It cannot wait for the beginning of the shooting war. In the present cold war stage of a possible World War III, a huge scientific battle is being fought realistically, although to an extent, secretly, in the laboratories of the principal nations. Our prospective opponents are straining every facility to win this stage. The Soviet government, for example, in its quest for the atomic bomb, has exerted far greater pressure upon its people to obtain results than is customary in peacetime America. The Soviets have had a realistic understanding of the grim fact that, at least in its research and development stages, World War III started in 1945. The necessity of greater efforts by this country to win the initial and critical phase of such a possible conflict are, therefore, obvious.

Research and Development Problems

Many problems in the research and development stage of a coming struggle require solution; some of them may be briefly mentioned. The need for high-class scientists, of which there is a perennial shortage, is a critical requirement in American security. In the second place, the art of the administration of scientists in the Armed Forces has not always been fully mastered by all concerned. A successful direction of scientists requires an appreciation of scholarship and an understanding of the methods by which scholarly results are obtained. The discovery of new knowledge cannot be dealt with as an ordinary command performance. Again, the mobilization of information for scientific work presents difficulties in an age in which new knowledge is being uncovered in unprecedented quantities. To make

facts which are discovered in one laboratory available to scores of scientists working elsewhere on the same problem makes necessary a better system of information service, including technical libraries, publications, indexes, abstracts, and opportunities for scientists to contact other scientists.

The foregoing are a few of the problems of scientific and technological progress. One more requires brief comment, that is, the need for greater emphasis on basic research. The United States has hitherto been something of a laggard in the field of pure science. If, however, we do not speedily reach a position of leadership in this work, the prospects for our national security will be anything but bright. In the past, the rapidly developing industries of the United States have bid successfully for a large proportion of the best scientific and engineering manpower. They have taken talented men away from basic science, while in Europe the great attractions, tangible and intangible, that are connected with scholarship have induced men of a very high order of ability to remain in this field. The extent to which Europeans have contributed the principles of science is shown by an examination of the lists of winners of Nobel prizes in chemistry, physics, medicine, and physiology. Until 1948, Americans had received 26 awards in those fields as compared with 115 which had gone to Europeans. The figures for the last decade, however, are more complimentary to this country than are those for the whole period. From 1939 to 1948, inclusive, 12 Americans received Nobel prizes in the physical sciences as compared with 16 Europeans.

The history of the atomic bomb is alarming in one sense because of the general foreign origin of the basic theory behind the bomb. The knowledge of the structure of atoms was built up over a period of generations by European scientists—British, French, German, and Russian. The understanding of radioactivity came about chiefly through experimentation in French, British, German, Danish, and Italian laboratories. The formula for the equivalence of mass and energy was arrived at by Einstein, who had a German-Swiss background. Some contributions were made by Americans from 1909 on, but the major work went forward in Europe. It is significant that when the news of the splitting of the uranium atom in Germany arrived in this country, in the beginning of 1939, the scientists who brought the matter to the attention of the American Government were foreign-born and foreign-educated scholars residing in the United States.

Need for Basic Research

For some years, the need for greater effort in basic research has been recognized. As Vannevar Bush stated in one of his stimulating writings: "Today, it is truer than ever that basic research is the pacemaker of technological progress. In the nineteenth century, Yankee mechanical ingenuity, building largely upon the basic discoveries of European scientists, could greatly advance the technical arts. Now the situation is different." Radical innovations in matériel and procedures, based on principles of natural science uncovered by fundamental research performed in this country, are essential if we are to keep and increase our leadership during these fast-moving times. For the future belongs to that nation which has the imagination and foresight to take the lead in science and technology. One of the chief purposes of the proposal for a National Science Foundation is to promote basic research, but several years have passed and the foundation has not thus far been established.

Meanwhile, much of the work has nec-

essarily been taken up by the Department of Defense. Each of the three services supports some basic research. The outstanding activity in this field is being carried on by the Office of Naval Research, largely through contracts with universities. Work of this kind should be pushed in both military and civilian agencies.

No one knows what revolutionary achievements may ensue, but it is safe to predict that some radical innovations will emerge to be written into strategy and to influence the balance of world economics and power. And, when we realize what strides are being made by other and not-too-friendly countries, it would seem obvious that our own progress had better be swift.

Eniwetok Atomic Tests

Operation 'Sandstone'

IN APRIL and May 1948, the Armed Forces of the United States joined with the Atomic Energy Commission in carrying out additional tests of atomic weapons. In contrast with the tests held previously at Bikini Atoll, the Eniwetok experiments were conducted in secret. The press and observers from other nations were barred from the area and pictures and descriptive material pertaining to the tests were not released until the fall of 1949.

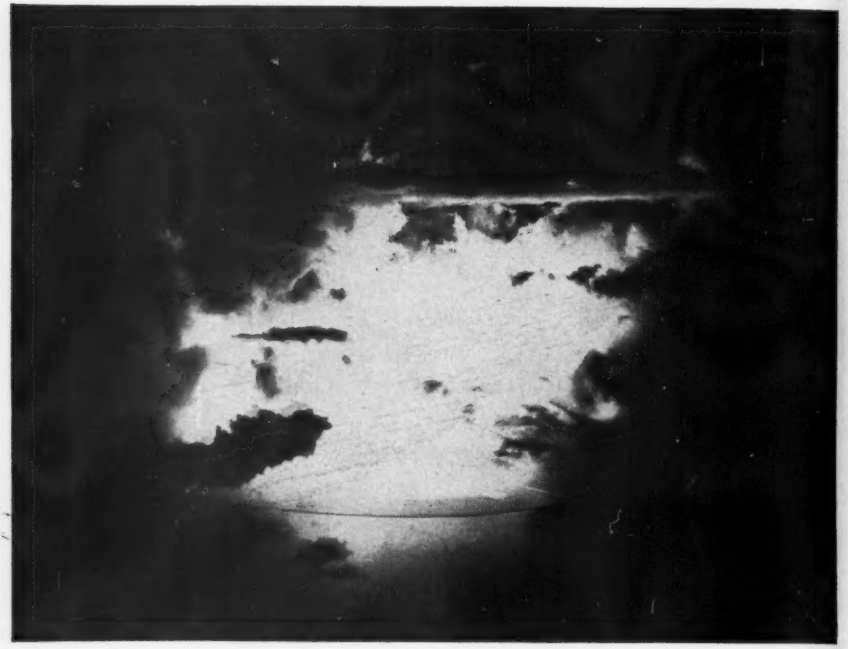
The recent tests differed from those at Bikini in another respect in that the earlier tests were conducted to determine the effects of atomic explosions on naval vessels, Army, Navy, and Air Force matériel as well as the effects on animals and plant life.

A task force of approximately 10,000 men under the command of Lieutenant General John E. Hull, USA, carried out the experiments. This force, known as Joint Task Force Seven, consisted of representatives from the Army, Navy, Air Force, Coast Guard, Atomic Energy Commission, Public Health Service, and Coast and Geodetic Survey.

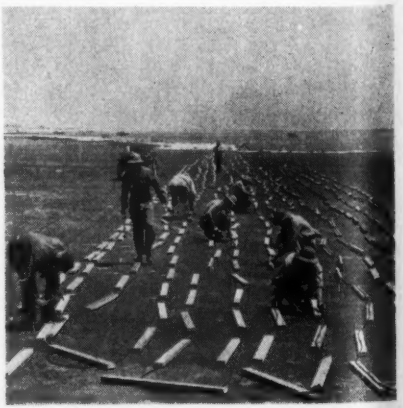
General Hull's announcement on completion of the tests simply stated that the bombs had worked and that the tests had yielded the required information.

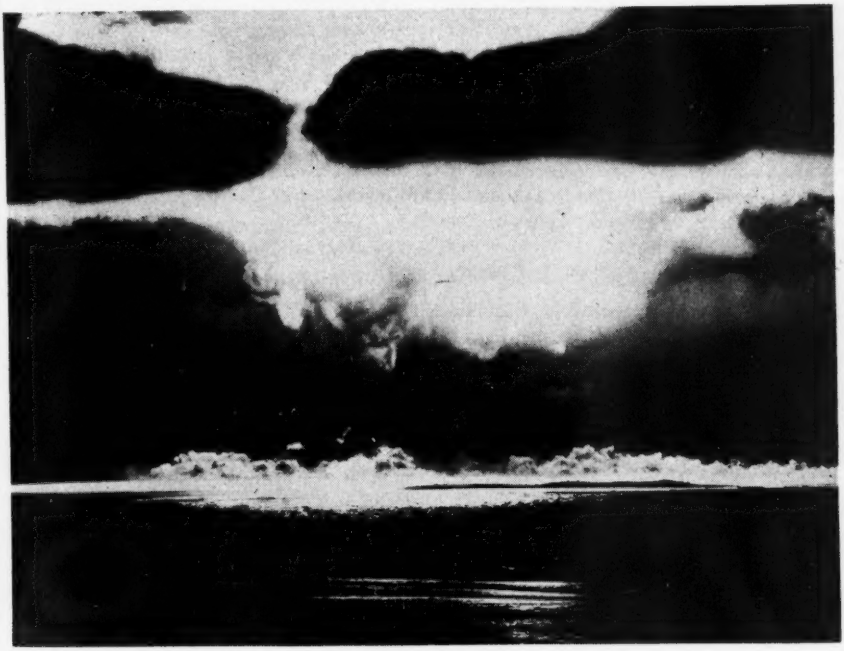
All photographs appearing on the next three pages are Joint Department of Defense and Atomic Energy Commission releases.

The fireball of an atomic bomb explosion (above) looms up in the dark of Eniwetok during one of the tests conducted during the spring of 1948. Lower left, some of the personnel of Task Force Seven board ship in Hawaii on their way to Eniwetok. Lower right, some of the top commanders of the task force attending a pre-test conference.

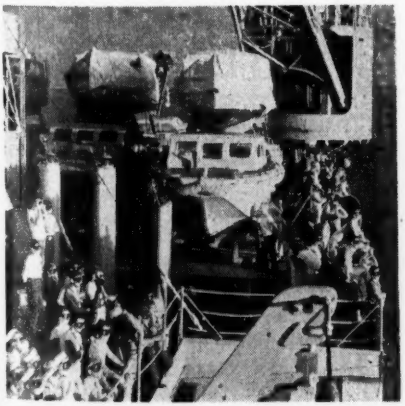


Another view of an atomic bomb test at Eniwetok (above) shows the fireball and shockwave of the explosion. Lower left, concrete cubes such as this were built near the detonation point of the bomb to protect recording instruments. Lower right, preparing for the tests, workmen attach flotation blocks to a water sample cable.





The fireball of an atom bomb explosion emerges through a cloud formation (above) during the tests at Eniwetok. Lower left, reflection from an atom bomb blast lights up a naval vessel and its crew at the moment of detonation. Lower right, an inspection party views the devastation of one of the islands at Eniwetok after one of the bomb explosions.



A Cloak for 'Overlord'

Colonel Henry G. Sheen, *Cavalry*
Instructor, Command and General Staff College

"Coming events cast their shadows—"

IN HIS final report to the Combined Chiefs of Staff in 1945, General Dwight D. Eisenhower included a statement regarding the strategic pre-conditions to the mounting of Operation *Overlord.*

"The broad strategy behind our main effort against the German war machine," General Eisenhower reported, "included as a highly desirable preliminary the successful conclusion of operations in North Africa and their extension across Sicily to the Italian mainland. With these accomplished, with the Mediterranean 'flank' freed for Allied shipping, and with the necessary special equipment built or in sight, we were at last in a position to prepare for the final cross-Channel assault which had been agreed upon since April 1942 as our main operation against Germany.

"It was correctly believed that only on the historic battlefields of France and the Low Countries could Germany's armies in the west be decisively engaged and defeated. . . . As part of our basic strategy, and in accordance with the task given to the Strategic Air Force under the Casablanca Directive in January 1943, the bombing of Germany, begun early in the war by the British Bomber Command, was intensified in May 1943 and continued with mounting strength to the end of the campaign. Neither the contemplated invasion of Europe nor the direct attack on the German industrial and economic system would be feasible until we had achieved supremacy over the German Air Force."

It was inevitable that the enemy should reach similar conclusions relative to Allied strategy. In a written statement prepared for American interrogators in 1946, Lieutenant General Bodo zV Zimmermann, Ia (AC of S, G-3) on the staff of Field Marshall von Rundstedt, *OB West* (Commander in Chief, West), states that Rundstedt submitted the following estimate to the German Supreme Command early in 1944:

"a. The year 1944 will bring the invasion in the West, and with it the decision of the War.

"b. The invasion may take place in winter, but it is more likely to come after the middle of March, and it is most likely to come in June.

"c. Where will the invasion take place? The most likely possibilities are:

(1) Along the English Channel.

(2) Astride the Seine estuary.

(3) Along the east coast of Normandy.

(4) Less likely possibilities are Brittany and Holland, still less likely, the Atlantic Coast.

"d. A landing on the French Mediterranean coast must be considered possible; such a landing can take place *before or after* the invasion from the West. Deceptive maneuvers are always possible and likely.

"e. The primary objective of any invasion from the West will be Paris. He who has Paris, has France!"

The conditions cited by General Eisen-

hower, as quoted above, were the major indications which prompted the enemy to name 1944 as the invasion year. A thorough appreciation of the affect of weather on military operations caused him to select the month of June, though he recognized that operations could be risked at an earlier time.

What prompted von Rundstedt to select the likely objectives named in his estimate? In 1947, while a prisoner of war in England, von Rundstedt made the following observations regarding paragraph c. of his estimate: "In my opinion, the Allies would give first consideration to a landing on the Channel Coast, although in that sector the fortifications were the strongest and they might expect the stiffest resistance. My opinion was based on several reasons: Since the Channel Coast was the nearest to them, the landing could be executed with the greatest element of surprise. Supply would be easiest. Uninterrupted aerial support was possible. The launching sites for V-weapons could be destroyed (we set completely vain hopes on the effect of these weapons on England). Above all, however, the Channel Coast was the beginning of the *shortest way* to the Rhine and the Ruhr! Success there, even if won at great sacrifice, would have very early results and a decisive effect on the war, for no German forces were available between the Channel Coast and the Rhine."

That the enemy had reached such conclusions was confirmed, in large measure, by the results of Allied intelligence and counterintelligence operations. The nature and location of beach defenses and fixed fortifications; the strength and disposition of all types of ground, sea, and air forces; the pattern of his logistical and administrative installations; and the type and location of his radar and similar warning stations, were among the positive indications of where the Germans expected to receive the Allied assault. These indications were given further substantiation as a result of the interrogation of captured enemy secret agents, concerning their missions and the nature of the information sought by them.

Enemy Intelligence Capabilities

Fully aroused to the imminent danger which threatened him from the United Kingdom, the enemy now hastily marshalled the total available strength of his intelligence services in the West. Ever active, the German and affiliated intelligence services now launched an all-out campaign. Deployed from Norway to North Africa, with elements operating in such neutral states as Sweden, Switzerland, Spain, Portugal, and Eire, as well as countries in the Western Hemisphere, the enemy employed all means at his command to exploit every possible source of information. Although the efficiency of the German intelligence services had suffered seriously from internal difficulties such as maladministration, disaffection of some of the stronger anti-Nazi elements, and friction between the political *(Sicherheitsdienst)* and military *(Abwehr)* factions, they were, nevertheless, capable of overt activities of high potential productivity.

In formulating the Allied counterintelligence estimate of hostile intelligence capabilities, it was essential that every possibility be determined and analyzed. It

"We achieved a degree of tactical surprise for which we had hardly dared to hope," General Eisenhower reported. Here was the result of the counterintelligence effort that preceded the Normandy assault

is quite obvious that the estimate was necessarily accomplished in full cognizance of the strategic, tactical, logistical, and other features of the plan for *Overlord*. The following were considered to be among the more important capabilities accorded the enemy:

1. *Reconnaissance.* Despite Allied superiority in the air and at sea, the enemy was still capable of conducting frequent photographic and visual reconnaissance from aircraft, submarines, and E boats.

2. *Press and radio monitoring.* The enemy monitored the British Broadcasting Company programs as well as those of other major Allied radio networks. Copies of a great number of Allied newspapers and periodicals were thoroughly examined by the enemy surprisingly soon after publication. In spite of the "voluntary" censorship in Allied countries, the public press and radio sometimes gave very valuable information to Axis intelligence.

3. *Prisoners and internees.* Allied air operations over the Continent inevitably led to the capture of crew members surviving from damaged or destroyed aircraft. The application of highly developed methods of interrogation to such prisoners could prove very profitable. Allied flyers who reached neutral territory, notably Sweden and Switzerland, could be "pumped" by secret agents infiltrated into internment camps for the purpose.

4. *Documents.* Maps, orders, personal letters and diaries, and other documents taken from prisoners or found in fallen aircraft would receive full exploitation by the enemy. Mail for Allied prisoners, delivered under the auspices of the International Red Cross, would certainly not be overlooked.

5. *Espionage.* The espionage capabilities available to the enemy were both numerous and varied. He would conduct such operations in Allied countries, especially the United Kingdom, and in territories occupied by Allied forces. He would also intensify his espionage efforts in neutral countries on the Continent and in the Americas. Neutral governments having diplomatic and commercial representation in Allied capitals would, of course, become the prey of intensified spying.

6. *Allied pre-invasion activities.* Quite apart from the offensive intelligence operations carried out by the enemy, he would also be able to produce considerable intelligence from information gathered as a result of the necessary preliminary activities executed by the Allies. These essential activities encompassed such matters as espionage, sabotage, and subversive operations on the Continent; supplying training and operating organized resistance groups such as the French *maquis;* air and naval reconnaissance of the *Neptune* area (objective area in Normandy); and the bombing of fortifications and other important targets in and near the objective area. The pattern, tempo, and areas of interest reflected by these preliminaries could, if not concealed by planned distractions, contribute immeasurably to the enemy intelligence effort.

That the enemy possessed such capabilities, as well as many more of lesser importance, was fully recognized by the Allied counterintelligence planners. It was also an accepted fact that Allied personnel, military and civil alike, were—by the very nature of their "democratic" and freedom-loving instincts, bred of their heritage and early environment—lacking in "security-consciousness." This was especially true of Americans!

The Counterintelligence Mission

The mission, therefore, of all Allied counterintelligence agencies employed in support of Operation *Overlord* was the simultaneous execution of three equally important tasks. These were: first, the planning and implementation of all measures designed to preserve secrecy regarding the date, place, and scale of the

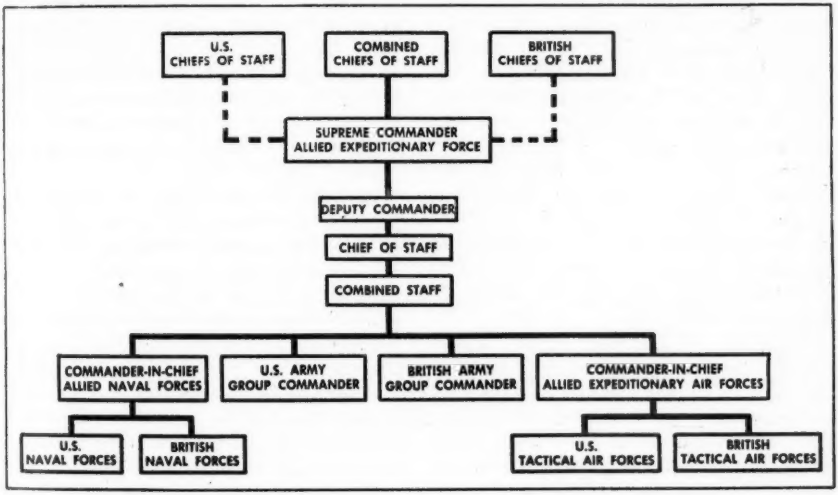
assault, as well as special equipment and matériel involved therein. Second, to insure that known and suspected enemy miscalculations—especially as to the objective area—remain undisturbed. Third, to refrain from the employment of security measures so restrictive as to curtail or otherwise hinder the effectiveness of the preparatory operational and administrative activities so essential to the success of the invasion.

Some idea of the immensity of the triple-task mission may be had, not alone from an understanding of the enemy's intelligence capabilities, but also from the following figures relating to Allied strength to be employed during the assault and early build-up operations:

1. *Ground forces.* 23 infantry, 10 armored, and 4 airborne divisions, plus corps and army troops, and additional supply and service units.

2. *Naval forces.* 6 battleships, 2 monitors, 22 cruisers, 93 destroyers, numerous minesweepers, some 5,000 troopships and cargo vessels, and an additional 4,000 landing craft and similar ship-to-shore boats. In addition, the Navy was to be responsible for establishing five artificial anchorages (known by the code name *Gooseberries*) immediately off the assault beaches. Subsequently, two of these were to be transformed into artificial harbors *(Mulberries).*

3. *Air forces.* In addition to the thousands of aircraft of the US Strategic Air Force and RAF Bomber Command, the Allied tactical air forces—in close support of ground operations—would employ 2,434 fighters and fighter-bombers, 700 light and medium bombers, and an appropriate reserve.



Planning and Coordination

Detailed security planning for *Overlord* was initiated in London in late August of 1943, after the Combined Chiefs of Staff had approved the Outline Operational Plan and progressed concurrently with other planning activity. This early work was accomplished by COSSAC (Chief of Staff, Supreme Allied Commander) and was taken over by SHAEF upon the ap-

pointment of General Eisenhower as Supreme Commander.

Since hardly a single phase of the preparations for such a sizeable undertaking did not have some bearing upon security, and in view of the large number of military and civil agencies involved, the amount of counterintelligence staff coordination was immense. Within the AEF orbit, coordination was conducted with the General and Special Staff Divisions of SHAEF and with appropriate echelons of the land, sea, and air forces to come under command of the Supreme Commander. Consultation and coordination were also undertaken with the British War Cabinet, the Home Defense Executive, the Home Office, the War Office, the Admiralty, the Air Minister, the Foreign Office, and General Headquarters of Home Forces. Planning and coordination were also carried out in close consultation with Headquarters European Theater of Operations US Army (ETOUSA), the Commander of US Naval Forces in European Waters (COMNAVEU), and the US Strategic Air Force (USSTAF).

Thanks to the efficiency of the British security services and the effectiveness of the many counterintelligence measures inaugurated and perfected by them since 1939, the imposition of the special *Overlord* requirements was greatly facilitated. Indeed, the experience gained during the evacuation from Dunkirk, the Battle of Britain, and the ill-fated Dieppe raid, and during the invasion of North Africa, Sicily, and Italy, contributed immeasurably to the plans and operations of the American, British, and Canadian security personnel involved in *Overlord*.

SHAEF Intelligence Directive Number 7, (Counterintelligence), was finally completed and approved, and was published on 8 February 1944.

Special Security Measures

As previously mentioned, the British security services had for nearly 5 years maintained a very effective internal security system throughout the United Kingdom. The specific requirements of *Overlord*, however, demanded the expansion and intensification of the already existing system and the superimposition thereon of some 40 special measures.

Certain of the special measures were of such a nature that their imposition could not be effected without publicity. This, naturally, would serve to alert the enemy as to the imminence of the invasion. Timing, therefore, was of the utmost importance. It was decided that the measures falling within this category would be initiated sufficiently far in advance of D-day so that the enemy's fears would gradually fade, at least to a certain extent, before the actual operation was begun.

Because of their vast number, peculiarities, and ramifications, the great bulk of *Overlord* counterintelligence functions and measures will not be covered, in detail, in this discussion. Of particular interest, however, are several of the unusual and unprecedented measures which were adopted.

Chief among the unprecedented security controls imposed for *Overlord* was the restriction upon neutral diplomatic personnel then resident in Britain. This was known as the Diplomatic Ban. It prohibited the movement of neutral diplomats and their couriers into or out of the United Kingdom, after a certain date in April 1944, and subjected all of their communications, hitherto immune, to Allied censorship.

On the first day of April 1944, the British Government imposed the Visitors Ban. This measure prohibited all travel into and, with few exceptions, out of a 10-mile wide coastal strip from the Wash to Land's End in Southern England. It was in this area that our assault was to be mounted.

Since it was hoped that the enemy would

be certain of Allied need for the almost immediate seizure of a port through which to support our invasion, special secrecy precautions were taken with regard to the artificial anchorages and harbors. For, had he learned of this "portable port," he would undoubtedly have paid more attention to the open beaches in Normandy. Similar secrecy was applied to *Pluto* (pipe line under the ocean), a newly devised cross-Channel method for expeditious supply of gasoline.

The distribution of aerial bombing and reconnaissance missions was so planned that greater interest was shown in the Pas de Calais area than was manifest in the actual objective in Normandy.

Intelligence operations on the Continent, and all relations with the resistance groups, were scrupulously controlled. As D-day approached, the United Kingdom and its bulging military and civil populations became almost completely sealed-off from the rest of the world.

The Result

The mounting pressure was, for some, extremely difficult to bear. There were an increasing number of security violations. Investigation of these, however, proved the causes to be largely founded upon normal human weaknesses. In no case was there any evidence to support a charge of treason. That the information, compromised through these acts, never reached the enemy is proof of the effectiveness of the security controls involved.

As to the result, General Eisenhower reported as follows to the Combined Chiefs of Staff:

"As the night bombers were finishing their work in the early hours of 6 June, the Allied sea armada drew in toward the coast of France. The crossing had, as Admiral Ramsay reported, an air of unreality about it, so completely absent was any sign that the enemy was aware of what was happening. No U-boats were encountered, the bad weather had driven the enemy surface patrol craft into port, the German radar system was upset as a result of our air attack and scientific countermeasures, and no reconnaissance aircraft put in an appearance. Not until after the naval escort fleets had taken up their positions and commenced their bombardment of the shore defenses was there any enemy activity, and then, taken unprepared as the Germans were, it was mainly ineffective. We achieved a degree of tactical surprise for which we had hardly dared to hope. . . . He (the enemy) was still uncertain as to whether he had to deal with invasion or merely a large-scale raid while our first assault wave was plunging shoreward to discover the truth about the vaunted Atlantic Wall. . . . The element of surprise was as effective in the western as in the eastern sector. . . . The enemy never succeeded fully in recovering from the confusion into which he was plunged by the surprise of our attack and the effects of our air and naval bombardment."

It was subsequently learned that Field Marshal Erwin Rommel, commander of Army Group B, under von Rundstedt, was absent on leave at his home in Ulm, Germany, on 6 June 1944!

Without the carefully tailored security cloak, it is just possible that the summer of 1944 might not have witnessed the forced entry of *Overlord* to evict the Nazi tenant of Fortress Europe.

WHAT DOES IT MEAN?

Colonel William E. House, *Ordnance Department*
Instructor, Command and General Staff College

HOW often have you read a sentence or a paragraph and then asked yourself, "What does it mean?"

How often have you had to put the same question to a subordinate who has placed before you for approval a draft of a letter or other document?

How often have you taken part in a conference which has not been able to complete its business because of disagreement over the meaning of a written instruction of some sort, or a written definition of responsibilities or functions?

Most important of all, how often have others been left with the question, "What does it mean?" after reading something that *you* have written?

In this article, it is proposed to deal briefly with the problem of making one's self understood in writing, particularly in the field of military writing. The objective of the article is twofold: first, to make the reader conscious of thi problem, which applies to some extent to all of us; second, to stimulate in the reader a desire for improvement in the art of expressing ideas in writing.

There will be no attempt to deal with this problem in a pedagogical or technical manner. The approach is from the layman's point of view—by a layman for laymen. For more detailed discussion of the finer technical points of grammar and composition, the reader is referred to the many authoritative text books which are found in most libraries.

Why do we write? We use the written word to record ideas, so that they may be transmitted to those who read what we have written. In military writing, these recorded ideas are to be used for one of three purposes, as follows:

1. To give orders or instructions.
2. To teach.
3. To provide information.

Any of these purposes is thwarted if the reader does not receive the idea exactly as the writer intended. Therefore, the writer must always be careful to express the idea exactly as he wants it to be received. In short, he must write exactly what he means, so that there is no possibility of being misunderstood.

Assuming that the writer himself knows what he is writing about, understanding by the reader can be assured if a few simple rules are followed. These are:

1. Strive for clarity of expression.
2. Practice simplicity of style.
3. Develop and use a broad vocabulary.

Clarity

Clarity permits the reader to grasp the idea correctly with a simple reading. A sentence or a paragraph which is understood only after repeated readings lacks clarity. It is even worse if the sentence or paragraph needs "interpretations" after reading. The writer has missed his target. The idea was sent, but it cannot be received with understanding.

Vagueness and faulty reference are

among the worst enemies of clarity. They both produce ambiguity and lead to misunderstanding.

Vagueness may grow out of construction—the manner in which the words are arranged to form a sentence—but it is more often due to the nature and meaning of the words themselves.

The following is an example of vagueness due to construction:

Minimum level of supply will consist of the sum of the following stocks.

(1) The expected daily rate of consumption of the forces (including such essentials for civilian use as the Armed Forces are required to sustain) supported by the depot, base, command, theater, or other logistical activity multiplied by the replacement (i.e., for contingencies such as unexpected high rates of consumption, destruction of stocks or handling facilities, or interruption of supply lines due to various causes) from the points of origin to the points of consumption (issue or release to another agency).

(2) Strategic stock levels.

Even after several readings, subparagraph (1) leaves the reader confused as to the intended meaning, largely because the construction has resulted in a jumble of words. The thread of the thought is lost about halfway through. Clarity would be aided by leaving out the qualifying and defining phrases included in the parentheses.

That portion of subparagraph (1) included in the first parentheses is an example, also, of vagueness due to the meaning of the words themselves. What is meant by "essentials"? The meaning must be something that can be "sustained," or else "sustained" has been used in an unusual sense which is not apparent from the context.

Vagueness resulting from the meanings of words often results from careless usage. For example, the word "requirements" means "the things or services *needed*." However, it is often used in the sense of "the things or services *furnished* to meet needs."

Clarity is often sacrificed by extensive use of a few words so general in meaning that the exact sense has to be deduced by careful analysis of the context. A frequent offender of this type is the word "indicate." This word has been observed within a few paragraphs of the same document with such various meanings as "show," "state," "report," "instruct," "demonstrate," "serve as a symptom," and "attest." An example of this is, "*the stock record card indicates quantities on hand available for issue.*" This leaves the impression that the stock record card *suggests* that there are quantities on hand available for issue. Actually, the stock record card states definitely or *shows* how much stock is on hand.

The effectiveness of military writing could be greatly increased if all prospective authors would strive for clarity of expression, practice simplicity of style, and develop and use a broad vocabulary

Clarity is always aided by correct punctuation. A judiciously placed comma will often eliminate possible confusion. Note the difference in sense, at first reading, in the following:

Without commas:

Elective periodic examinations and physical check-ups of well persons and similar time consuming procedures will be discontinued.

With commas:

Elective periodic examinations and physical check-ups of well persons, and similar time consuming procedures, will be discontinued.

In some instances, *too many* commas will

only add to the confusion. This is generally due to including too many ideas and qualifications in one sentence. For example:

Primary consideration must be given to the care and treatment of military personnel and, except in emergency cases, when medical attendance of non-military personnel, including dependents, on either an in-patient status, interferes with the accomplishments of this directive, priority must be given to military personnel.

Let us see what we can do to this example to improve clarity. First, what is the principal idea? It is, "*Primary consideration must be given to the care and treatment of military personnel.*" All the rest of the long sentence repeats this idea, but it has been made confusing by the insertion of a complex exception. Now that the trouble has been detected, the example can be rewritten as follows:

Primary consideration must be given to the treatment of military personnel. Non-military personnel, including dependents, will be given a lower priority for treatment except in emergency cases.

Clarity in writing is often lost through the faulty reference. This is illustrated by the following examples:

Administrative planners must seek timely information from the combat planners to insure their always being in a position to support combat operations as desired. The natural tendency to connect "their" with the nearest likely antecedent, "the combat planners," produces an erroneous impression. The correct meaning is not gained without reading the sentence at least one more time.

The following example is a part of a discussion of the subject of "Shortages in Authorized Supplies." In the discussion, it stands as a separate subparagraph. This statement shows the effect of stringing together a series of words or phrases without making clear their interrelationships.

Caution must be exercised within a theater in approving authorization for special issues to prevent dissipation of supplies furnished for replacement and maintenance prior to receipt of the additional supplies needed to reduce the increased shortage.

After reading this sentence two or three times, we begin to see that it contains two related but independent ideas. The first is that *caution must be exercised;* the second gives *the reason* for exercising caution. We therefore rewrite it as follows, using *two* sentences, one for each idea.

Caution must be exercised within a theater in approving special issues which will dissipate stocks furnished for maintenance and replacement. Such special issues, if made prior to receipt of corresponding additional supplies, will either create a shortage or aggravate an already existing shortage.

Clarity is best achieved when the writer strives for readability. He tries to make it easy for the reader's mind to follow the development of successive ideas without conscious effort. Ease of comprehension develops interest. Interest, in turn, stimulates understanding.

Simplicity

Simplicity is the companion of clarity. Long and complex sentences, liberally salted with long, erudite sounding, polysyllabic words, quite likely produce a feeling of satisfaction in a writer. But they are equally likely to confuse and bore the reader.

Be brief. Be specific. Don't clutter up what you say with useless words. If you have a choice between a long word and a short one, choose the short one. Try to find words that make the reader form a mental picture as he reads.

Vocabulary

Technical writing practiced over a period of years produces a tendency to use stereo-

typed words and phrases. This, in turn, may result in a badly shrunken vocabulary if the writer does not give the problem some thought. The danger of diminished vocabulary is particularly great in the field of military writing. The rigid impersonal form resulting from custom and the constant exposure to the style used in regulations and manuals produce habits which keep us from searching constantly for better ways to express our ideas.

It has been estimated that the average instructor—more appropriately called "average author"!—at the Command and General Staff College needs a vocabulary of about 15,000 general words, plus another 1,000 technical words for special uses. This seems quite reasonable, in view of the fact that lawyers and newspaper men need, and generally use, vocabularies of about 25,000 words. Should the average military writer—an officer spending his life in the service—be content with a vocabulary smaller than that of an instructor? The answer is obviously "No." While the instructor may write 10 times or 100 times more words in a year than the average officer on other duties, they both need the scope and accuracy of expression that can come only from having command of extensive vocabularies. Clarity and simplicity come most easily to the writer who is best able to select exactly the right word or phrase to express his idea.

Too many of us become content to leave our ideas to the mercies of "all purpose" words. We *contact* everybody with whom we do business, when, as a matter of fact, we *call* some, *speak* to some, *meet* with some, *deal* with some, *report* to some, and *get information* from others. Over a period of years, not one instance of the use of *contact* has been observed where a more meaningful substitute was not immediately apparent.

Another word which has been made to carry burdens of meaning far beyond its capacity is *effect*, used in the sense of *do*, *cause*, *accomplish*, or *perform*. A certain action is said "to effect the delivery of supplies;" another is said "to effect a higher state of morale in troops," and so on, leaving the reader to guess at just what really is meant.

Our language is the most useful tool we have. We would still be in a state of savagery without it. To gain the full benefit of this tool, we must constantly increase its effectiveness by enlarging our vocabularies. There is no finer way to spend 10 or 15 minutes now and then than by opening a dictionary at random and learning some new words which can be put to work expressing our ideas.

We can all increase our effectiveness as writers by practicing the three easy rules stated earlier in this article. For emphasis, these rules are restated:

1. Strive for clarity of expression.
2. Practice simplicity of style.
3. Develop and use a broad vocabulary.

Above all, do not put the burden of understanding on the reader.

Feb 1950

In war there is no second prize for the runner-up.
General Omar N. Bradley

Defense of a River Line

Lieutenant Colonel Chester A. Dahlen, *Infantry*
Former Instructor, Command and General Staff College

"OWING to the restrictions which they impose upon movement and maneuver, wide and unfordable rivers exercise considerable influence on military operations. They constitute obstacles to an attack and natural lines of resistance for defensive and delaying action."—FM 100-5, FSR-Operations (1944), par. 786.

* * * * *

In view of the many successful crossings of unfordable rivers made by the United States Army during World War II, it appears that the above statement has lost some of its force—that wide and unfordable rivers no longer have potential value as military obstacles. The purpose of this article, then, is to re-examine our doctrine on the defense of a river line, and, in light of World War II experiences, determine its validity as applied to the two basic methods of defending an unfordable river: position defense, and defensive-offensive action.

Position Defense

Map 1 shows the schematic deployment of an infantry division in defense behind an unfordable river. It illustrates five important characteristics of this type of defense which contribute materially to the defender's strength:

1. The river, as a major obstacle, serves to strengthen the defense by obstructing enemy movement.

2. The river constitutes a good field of fire.

3. The defender's flanks are secure. The attacker cannot avoid or turn the position but must make an assault crossing.

4. The defender can defend a broader front than in cases where no unfordable river exists.

5. The defender can hold out powerful reserves which operate on interior lines.

Except for broader frontages and consequent lower troop density, the organization of the battle position, the mission of the troops garrisoning those positions, the employment of the artillery, the location and employment of the reserves, and other considerations are the same as for the conventional position defense.

The advantages occurring to a defender using a river line as an obstacle react in the form of important disadvantages to the attacker:

1. The attacker must submit his forces to the defender's concentrated fire while the attacking forces are in formations approaching or crossing the river that provide minimum protection.

2. The attacker's over-all operation is canalized by the crossing sites selected, facilitating further concentration of enemy fire at a relatively few critical points.

3. The attacker is denied freedom of maneuver, particularly of reserves, until the bridgehead is firmly established.

Defensive-Offensive Action

The method of defending behind an unfordable river by defensive-offensive ac-

tion is employed when insufficient troops are available to adopt the position defense method. In this case, abnormally wide frontages are assigned front-line units which, in fact, constitute little more than a defensive shell along the river line. Greater reliance is placed on the counterattack to destroy the enemy or drive him back into the river after he gains a lodgment on the near bank.

Map 2 shows the schematic deployment of an infantry division employing the defensive-offensive method in defending a wide front along an unfordable river line. This type of defense has the following characteristics:

1. The near bank is not defended in strength, but is garrisoned by little more than outposts.
2. All units defend sectors that are abnormally wide.
3. Strong mobile reserves are held out.
4. There is an increase in communications requirements as regards means and speed.

The advantages to this defense are:

1. It permits maximum economy of force.
2. It protects the bulk of the defending forces from massed enemy fires preliminary to the crossing.
3. It enables greater dispersion against enemy air attack.
4. The strong mobile reserves provide increased flexibility to meet various courses of action adopted by the enemy.

The disadvantages of this method of defense are:

1. It increases the probability of the enemy gaining a foothold on the near bank.
2. It reduces somewhat the density of defending fire that can be brought to bear on any given point along the river.
3. It requires maximum efficiency in coordination, timing, movement, and communications.

Discussion

With this brief portrayal of our river line defensive doctrine, it is well to pause and evaluate the importance of the river itself as a military obstacle and the contribution it makes to these two types of defense.

First, the river, to be a military obstacle, must be defended. If this is done, the river will halt the advance of an enemy. It will cause him to regroup his forces, to conduct special training, to assemble special river-crossing equipment, and to adopt special tactical formations to force a crossing. In other words, the river enhances the general strength of the defense by providing an obstacle which requires considerable preparation for crossing.

Many World War II experiences indicated that an unfordable river is still an important military obstacle, the value of which increases in direct proportion to the skill shown by the defending forces

Second, the river, as an obstacle, places the attacker at a maximum disadvantage and the defender at a maximum advantage. Why? Because, to force a crossing, the attacker has to attack straight ahead. He cannot maneuver, and, therefore, his attack can be broken up. This condition is especially true as regards a defender who employs a position-type defense. Since this advantage greatly increases the strength of the defender's position, he is justified in exercising certain economies in force while still enjoying favorable odds in the prospect of breaking up the enemy's attack short of a lodgment on the near bank. Briefly, this condition, imposed by an unfordable river on the attacker, justifies the adoption of the defensive-offensive method by the defender.

A third reason for the importance of the river as an obstacle, and one which complements the other two, is the vulnerability of the attacking forces in moving to and crossing the river. The river not only provides an excellent field of fire but increases the vulnerability of the attacking enemy troops as they attempt to cross in their assault craft. For this reason, the defender can place greater reliance on the capabilities of his artillery. The assaulting troops, huddled in their boats, are indeed a lucrative target to the devastating effect of artillery firing time or variable time fuse. On the part of the defender, it means that every foot of the river must be kept under constant surveillance and that each observer must not only be able to deliver effectively the fire of his own weapon but must be able to call for and control the fires of all available supporting weapons.

Finally, the river as an obstacle places a definite limitation on the attacker as to his scheme of maneuver in forcing a crossing. The assault equipment and methods he must use not only limit the type and number of troops he can initially employ, but they increase materially his time and space factors for reinforcing his assault echelons with additional troops, armament, and supplies. The defender, in turn, can match these limitations by committing a smaller portion of his force to an outposting mission, retaining the bulk in reserve as a powerful counterattack force.

Situations of Vulnerability

These advantages afforded the defender can also be expressed in terms of vulnerability imposed on the attacker. The unfordable river, as a military obstacle, forces on the attacker certain situations, or conditions, of vulnerability. They are:

1. Assembly and launching of assault troops and equipment.
2. Crossing in small boats.
3. Limited armor on the far bank to support the assault.
4. Limited freedom of maneuver until a bridge is built.
5. Insecurity of the entire lodgment until artillery and other supporting elements are in operation on the far bank.

These situations of vulnerability are present in all river crossings. Such operations are not successful until the attacker has overcome them all. On the other hand, the defender, capitalizing on these same situations of vulnerability, can defeat such an attack. The history of World War II bears this out. Three river crossing operations are cited below to show how important are these situations of vulnerability caused by the river and how the advantage taken of them by the defender is a direct measure of the results achieved, i.e.—the successful defense of a river line.

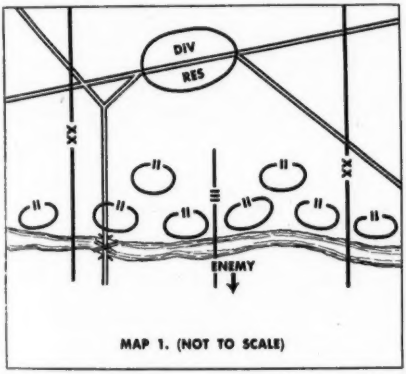
The 3d Infantry Division Crosses the Meurthe *

During October and early November 1944, the 3d Infantry Division, part of VI Corps, had been fighting its way east from the Moselle River to the Meurthe River. On 10 November, it received Corps orders to force a crossing on or about 20 November, and then, in conjunction with 100th and 103d Infantry Divisions, to continue the attack east into the Vosges Mountains. The initial division plans were to force a crossing with the 7th and 30th Infantry regiments in assault, the 7th Infantry on the right. This assault crossing was to be made in small boats preceded and protected by heavy artillery fire. The 15th Infantry, to be the division reserve, was outposting the river line. By careful observation along the river bank and patrolling across the river, this regiment determined that the Germans were not defending the far bank. Instead, they were occupying defensive positions about 1,000 yards inland

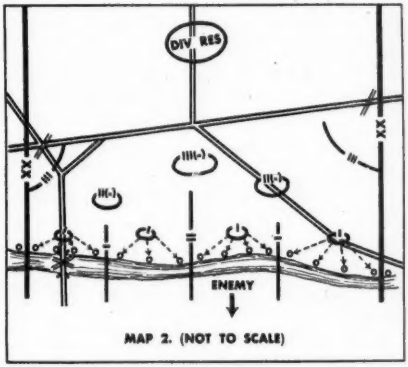
* "The 3d Infantry Division Crosses the Meurthe," MILITARY REVIEW, February 1947.

along the St. Die-Clairefontaine Highway.

On the basis of this information, the division commander decided to capitalize on the enemy's failure to defend or even outpost along the river. He ordered a new plan of attack. It was to establish a line of departure some 500 yards inland on the far side and to infiltrate the assault troops across under cover of darkness. Two foot bridges were to be established in the zone of each assault regiment and the two assault battalions of each regiment were to cross, to close on the line of departure, and be ready to jump off at H-hour, 0645, 20 November.



MAP 1. (NOT TO SCALE)



MAP 2. (NOT TO SCALE)

Commencing with darkness, 19 November, the execution of this plan was started. Shortly thereafter, four infantry platoons crossed safely in small boats to protect the building of the foot bridges. By 2359, all four foot bridges had been constructed. By 0600, 20 November, five infantry battalions had crossed unmolested with four of them on the line of departure. At 0615, artillery preparation fire started, and at 0645 the assault battalions jumped off, seizing their initial objectives against moderate opposition. One hundred fifty casualties were suffered, due mainly to mine fields. During the day, the attack moved rapidly ahead. The foot elements of the 15th Infantry were assembled and moved to a division reserve area across the river. Although the division bridgehead line had not been completely reached by darkness, the security of the bridgehead was assured. The attack was a success.

During the night, 19-20 November, the engineers also constructed one infantry assault bridge, Class 6, which permitted the passage of light vehicles. The construction of heavier bridges at St. Michel and Clairefontaine bridge sites was delayed initially because of enemy fire from flanking positions. By darkness on the 20th, these enemy positions had been overrun and work was started. On 21 November, two heavy bridges were complete at the St. Michel site, one M2 Treadway at 0645, and a Bailey bridge at 1000. At the Clairefontaine site, a Bailey bridge was completed by 1330 and by 1630 was reinforced to a Class 40 bridge. This became the main division bridge. The second heavy bridge at this site was finished during the night, 21-22 November. The rapid construction of these bridges permitted complete support and reinforcement to the assault troops. The Meurthe River was no longer an obstacle to the 3d Infantry Division or VI Corps.

Measured in terms of surprise, speed

of accomplishment, and low casualties, this operation was highly successful. More brilliant, indeed, was the division commander's decision to capitalize on the enemy's failure to use the Meurthe River as a military obstacle. The Germans failed completely to take advantage of the situations of vulnerability imposed by the river on the assault troops of the 3d Division. Their defense of the Meurthe was doomed at the outset.

The 45th Infantry Division crosses The Rhine *

During the middle of March 1945, the 45th Infantry Division, as part of the XV Corps, Seventh Army, broke through the Siegfried Line and closed to the west bank of the Rhine River. On 24 March, XV Corps issued orders for an assault crossing of the Rhine. The plan was to force a crossing with the 45th and 3d Infantry Divisions in assault to secure a Corps bridgehead (the Autobahn) and then, with the 63d and 44th Infantry Divisions and the 12th Armored Division, continue the attack east on Corps order to secure the Odenwald Mountains and crossings over the Main River. D-day was set for 26 March and H-hour at 0230.

At this time, the 45th Division was employing the 157th Infantry to mop up and patrol to the west bank of the Rhine River. The other two regiments, the 179th and 180th, were in the rear, training for the forthcoming operation.

Prior to the operation, XV Corps was unable to make an accurate estimate of the opposing enemy strength. The disorganized retreat of the German First and Seventh Armies before the rapid advance of the American Seventh and Third Armies had produced such confusion and disorganization in the German Army that it was believed that the Germans, themselves, could not accurately estimate the strength of their own forces. Based on previous contact, it was estimated that elements of 22 divisions had escaped across the Rhine in the zone of the Seventh Army. How many of these units were available to oppose the Corps crossing could not be determined. It was estimated that the German strength to oppose the initial assault would not average more than 50 men per kilometer of river front.

The Seventh Army, in its history, states: "To oppose the Seventh Army (XV Corps) bridgehead, the enemy would probably make a determined but unsuccessful effort to oppose the crossing. His opposition was likely to prove less a hindrance than the current, the river banks, and other technical difficulties." This estimate of enemy strength was borne out by the results of a reconnaissance patrol from the 1st Battalion, 180th Infantry. During the night 24-25 March, it reconnoitered along the east bank of the Rhine, just north of Worms. The patrol found no wire, mines, or emplacements. It was believed that the patrol was seen by the enemy, but it was not fired on and was able to return safely with its information.

The attack of the 45th Infantry Division began as scheduled. To secure surprise, no preparatory artillery fires were scheduled. Two battalions of each regiment were in the assault. The leading waves of each assault battalion crossed in storm boats, followed by additional waves in assault boats. The 179th, on the left, encountered some *flak*, small arms, and scattered mortar fire while crossing and met strong enemy resistance on the far bank. By 0315, both assault battalions had completed crossing their foot elements, had mopped up along the river bank, and had secured an initial bridgehead. The assault crossing of the 180th Infantry apparently caught the Germans by surprise, for very little fire was received by the assault waves during its crossing. However, the assault waves met with heavy fire on landing, and the forward advance of the Regi-

* *Seventh Army History*, Phase IV (Part 2).

Above, troops of the 30th Regiment, 3d Infantry Division, practice a river crossing in France in November 1944, prior to the crossing of the Meurthe River. Below, Dukws ferry supplies across the Rhine River on 26 March 1945, as the 45th Infantry Division, XV Corps, expanded its bridgehead.—US Army photos.

ment was slow and costly. Nearly half of the assault craft used in subsequent waves were destroyed by enemy fire. By 0315, all foot elements of the two battalions of this regiment were across. After a fierce struggle, they overcame the initial enemy resistance along the river bank.

Once the initial beachhead had been secured, a general advance was made to the east against deteriorating German resistance. Small towns and road blocks in the area were quickly flanked and subdued. By 0800, the Division had reached the railroad line and was continuing its attack through the Jaegersburg Wald. By 1720, advance elements of the two regiments had reached the Autobahn, the Corps bridgehead line. To the north, the 2d Battalion, 179th Infantry, had met strong resistance in Gernsheim. By nightfall, this battalion had taken the town and had continued its advance to the north and east. By darkness, the Division had secured the Corps bridgehead line in its zone and had made contact with elements of the 3d Infantry Division on its right and the Third Army on its left.

The division reserve, the 157th Infantry, started crossing at 1100. By 2000, it had closed into an assembly area in the vicinity of Biblis. During the day, engineer troops, in addition to operating the assault craft, constructed and operated two infantry support rafts and two heavy ponton rafts, ferrying combat vehicles of the infantry regiments and one field artillery battalion. Work was also started on a heavy ponton and a floating treadway bridge, which were completed early on 27 March.

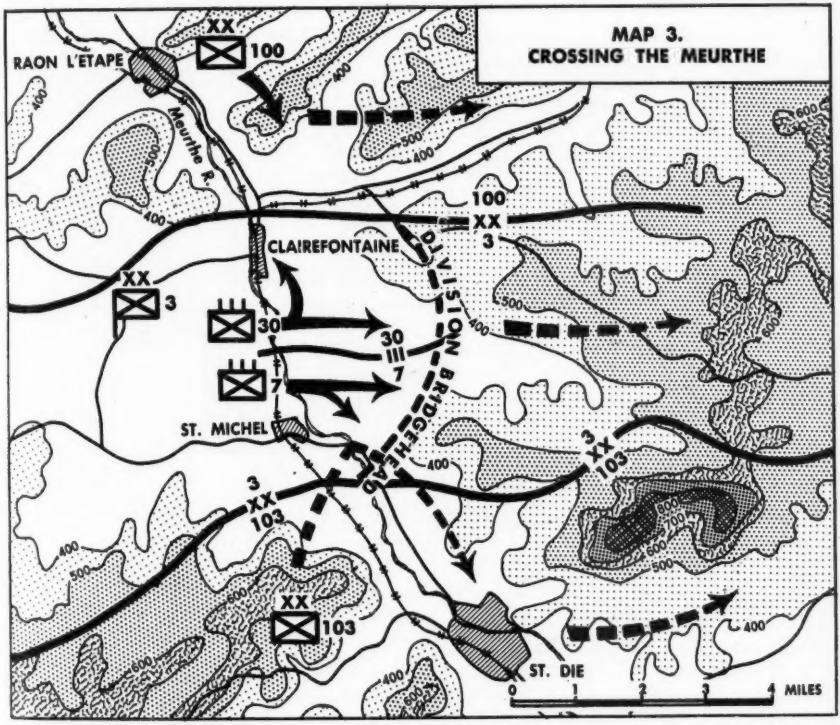
The attack was resumed on 27 March with three regiments abreast. Troops were mounted on tanks, tank destroyers, trucks, and captured German vehicles. The enemy was retreating to the Main River. Only two towns offered resistance. Elsewhere, the Division encountered disorganized attempts to delay its advance. By nightfall, the 179th Infantry on the left (north) flank had advanced 16 miles and had patrolled 11 miles farther to the Main River. The forward progress of the other two regiments was nearly as good.

Seventh Army, in its history, reports the first day's operations of the 45th Infantry as follows: "Opposition to the 45th Division's operation had been moderately strong on the beach but had proved to be only a hard shell shielding a soft interior. The thrust inland was only lightly opposed once the shell had been pierced. Shortly after the initial penetration was made, guns firing into the crossing area were overrun, and the operation continued with a minimum of difficulty."

This river crossing operation by the 45th Infantry Division was a success. The mighty Rhine River, greatest barrier of all in Western Europe had been breached. In 2 days fighting, the division had reached and passed the Army bridgehead line. The heaviest fighting in these 2 days occurred in the first few hours of the attack—along the east bank of the River. Once the crossing sites had been cleared of enemy fire, the attack proceeded without difficulty. The unhindered operation of the ferries and the construction of the bridges permitted rapid reinforcement of troops, armor, artillery, and supplies. The outcome was never in doubt, once the initial bridgehead had been secured.

Evaluating this operation in terms of vulnerability, we again see the good fortune that befell our troops. The Germans had failed to take full advantage of the Rhine as a military obstacle. The Seventh Army, later in its history, reports that the Germans had actually deployed elements of 40 antiaircraft battalions to defend in the army zone from the Rhine to the Main. With the few troops the Germans had been able to commit along the river, they had created some doubtful moments. What would have been the results had the Germans been able to render full artillery support to these isolated units? What would

have been the results had they been able to launch a strong counterattack against the 180th Infantry after having destroyed 50 percent of the assault craft? What would have been the results had the Rhine been defended by infantry units occupying organized, coordinated, and supported defensive positions? What would have been the results had the Germans been able to fully exploit the situations of vulnerability imposed on our forces? For a possible answer, let us examine another attack of a river line.



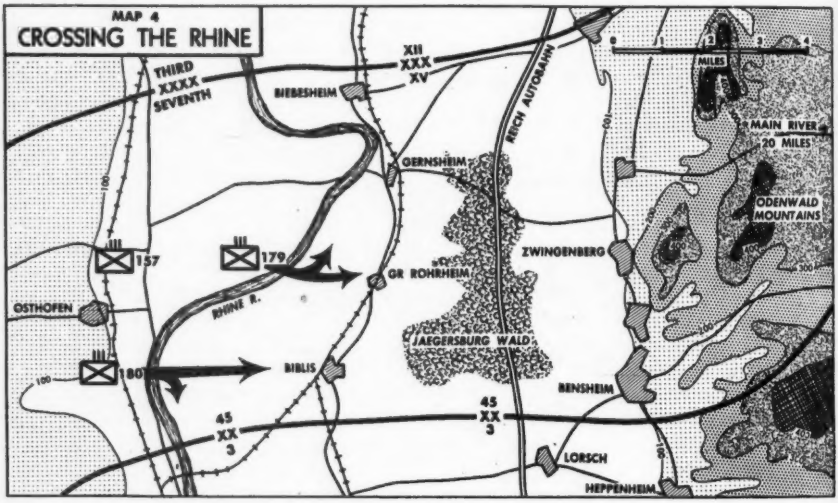
Crossing the Rapido *

During January 1944, the Fifth Army mission in Italy was to break through the Gustav Line and keep continued pressure on the Germans to prevent their shifting of reserves to counteract Operation *Shingle* (Anzio), scheduled for 22 January 1944. In furtherance of this mission, II Corps planned to envelop the right (south) flank of the Germans' position at Cassino. To do this, it planned to attack frontly across the Rapido River in the vicinity of S. Angelo and establish a Corps bridgehead to include Pignataro and then pass armored and infantry troops through the bridgehead, enveloping Cassino from the south. The mission of establishing the bridgehead was given to the 36th Infantry Division, less the 142d RCT which remained in corps reserve.

The plan of attack for the 36th Infantry

* *Fifth Army History*, Vol. IV.

Division in establishing this bridgehead was as follows. The 141st Infantry on the right (north) was to cross at the "S" bend in the River with two battalions in column, the 1st Battalion in assault. The 2d Battalion, in regimental reserve, was to make a demonstration south of the "S" bend. This Regiment was to establish an initial bridgehead and then attack west and south to capture S. Angelo. On the south flank, the 143d Infantry was to attack with two battalions abreast, the 1st and 3d, with the 2d (in reserve) prepared to cross at either site. The mission of this Regiment was to establish its initial bridgehead, to protect the right flank of the Division, and to prepare to assist the 141st in the capture of S. Angelo. Time of the attack was 2000, 20 January 1944. An artillery preparation of increasing intensity was to be fired from H-30 to H-hour and followed by concentration to advance by call on phase lines in front of the infantry. Companies A, B, and C, 2d Chemical Battalion, were attached to the Division and given the mission of supporting the attack with smoke and of increasing the density of the artillery fires. Each assault regiment was reinforced with one engineer combat battalion, and a third battalion was given the general mission of clearing mines at the crossing sites and in the bridgehead area. These three battalions were prepared to construct heavy bridges once an initial bridgehead had been secured.

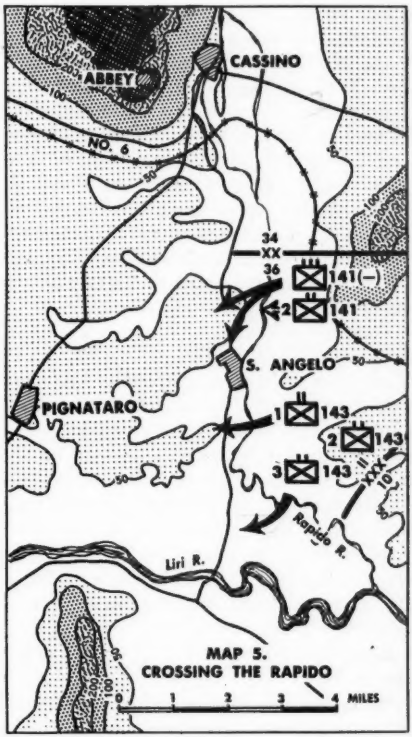


The terrain in the area of this attack favored the Germans. Along the west bank, paralleling the River, was a low bluff, averaging 40 feet in height. This bluff was the forward limit of the German battle position, and it afforded good fields of fire and close observation of the River and the low, flat ground on the opposite side. The River was 25 to 50 feet wide. There was a strong current, and the vertical banks were 3 to 6 feet high. The Germans had built extensive fortifications in this area. Across the River, they had constructed a mine field, a mile wide, protecting the

narrow dirt road which paralleled the River. Additional mine fields were laid at all possible crossing sites. Prior to the attack, German patrols, under cover of darkness, would re-lay mines in the gaps previously cleared by our engineer troops. On their side of the River, as part of the Gustav Line, the Germans had built strong defensive positions, consisting of concrete or steel emplacements connected by camouflaged communication trenches. The forward positions, built into the bluff, were protected to the front by double apron wire and additional mine fields. Fields of fire had been cleared to cover the banks of the River. To the rear were additional machine-gun emplacements and other direct fire antitank weapons. This entire zone of fortifications was covered with interlocking bands of machine-gun fire.

First Effort, 20-21 January 1944

The preparations for the attack were carried out as planned. On 20 January, XII Air Support Command flew 124 sorties in support of this operation. At 1800, the 1st Battalion of the 141st Infantry moved out of its assembly area for its boat dump area, reaching that area about 1900. At this time, a flare was fired from across the river. Surprise was lost, and the Germans immediately opened up with artillery fire on probable assembly areas and boat dump areas, possible crossing sites, and likely crossroads. Casualties in the Battalion were heavy and many of the pneumatic assault boats were destroyed. Cleared lanes through the mine fields were hard to follow. The white tape had been shot up. Engineer guides became separated from their units. Assault companies became intermingled. By 2100, a few boat loads from Companies A and B were across. The engineers, under enemy fire and battling the swift current, struggled valiantly to build foot bridges. As soon as one was built, it was damaged by enemy fire or the swift current. From the remnants of four bridges, one was finally constructed by 0400. The remainder of Companies A and B were able to cross on this bridge. The German machine guns, mortars, *nebelwerfers*, and mine fields took their toll of casualties from these assault units. The 3d Battalion was unable to cross, and just prior to daylight it withdrew to its assembly. By morning, 21 January, all communications with the forces across the river had been destroyed; only by their fire could their positions be determined.



To the south, the 1st Battalion, 143d Infantry, had better luck. The leading company was able to cross before the

enemy realized that such an attack was being made. By 0500, two foot bridges had been installed so that the 1st Battalion was able to complete its crossing. By 0700, one of these bridges had been destroyed and the other badly damaged. Advance inland by this Battalion was stopped by mine fields, intense machine-gun fire, mortars, and direct fire from enemy tanks or other self-propelled weapons. To avoid annihilation, the battalion commander ordered the withdrawal of his unit. By 1000, the Battalion had returned to the east bank of the River. Farther to the south, none of the 3d Battalion succeeded in making a crossing. Engineer guides became lost in dense fog and strayed into mine fields, causing some casualties and destroying all the pneumatic rubber boats. Additional efforts to cross that night were stopped by enemy artillery fire. By daylight, this Battalion had withdrawn to its assembly area.

Second Effort, 21-22 January

At 1000, 21 January, the division commander ordered the attack to be resumed. On the south, the 3d Battalion, 143d Infantry, jumped off at 1600; by 1830, under the cover of smoke, elements of three rifle companies had been ferried across. A foot bridge was then constructed so that the remainder of the Battalion was able to cross, followed by the 2d Battalion. These two battalions were able to advance inland about 500 yards before increasing enemy fire stopped further progress. To the north, the 1st Battalion, 143d Infantry, was able to cross two rifle companies by 1835. The remainder of the Battalion was unable to follow because of enemy fire. Further advance of the assault elements of these three battalions deployed in the low ground in front of the enemy's battle position was stopped. Their positions were untenable. By 1240, 22 January, all three battalions had been driven back across the river.

In the zone of the 141st Infantry, strong efforts were made during the night to reinforce elements of the 1st Battalion which were already across. By 0200, 22 January, two foot bridges had been constructed and the 2d and 3d Battalions were able to cross. Progress was slow and costly. During daylight, fog and heavy smoke limited the visibility of the attacking troops and of the supporting artillery. By 1600, all communications with these three battalions had been lost. All bridges had been shot up and destroyed. The forces across the River were isolated. Close support artillery fires could not be delivered because of restricted visibility. At this time, the Germans counterattacked with two rifle companies. This attack was stopped. The Germans renewed the attack in force and by 2000 practically no American fire was heard. By 2030, all the fire from the west bank of the River was German. About 40 troops from this Regiment returned to the east bank of the River; all the rest had either been killed or captured.

The Fifth Army history summed up this operation as follows:

"In assessing the situation on 23 January, it is apparent that our efforts to cross the Rapido were a costly failure. A veteran division, victorious in the battles of Salerno, Mount Maggiore, and San Pietro, had suffered its first significant defeat. Officers and men were well trained; plans had been made carefully; supplies and equipment, with the possible exception of boats and footbridges, were ample. Even this exception was not a decisive factor in the failure, since many companies succeeded in crossing the River. Inability to follow through with strong reinforcements and supplies, lack of visibility for more effective artillery fire on enemy counterattacks, and disruption of communications by hostile fire were all contributing factors. Even more important as a reason for the failure were the enemy's extremely

strong and expertly defended fortifications west of the River."

This operation shows what can be the results when situations of vulnerability are fully exploited by the defender. Here, the Germans, strongly entrenched, protected by mine fields and wire, supported by artillery and reserves, had employed the Rapido River to its maximum as a military obstacle. The vulnerability and resultant casualties of our troops were so great that even an initial bridgehead could not be secured. As a consequence, bridges could not be built to permit the follow-up of reinforcing troops, armor, and artillery. Lacking this, the attack was destined to fail.

Conclusions

These examples of World War II experiences re-emphasize the validity of our tactical doctrine in the defense of a river line. An unfordable river is a military obstacle of importance. As such, it will impose on the attacker certain situations of vulnerability which he must overcome before his attack will be successful. On the other hand, the defender, to be successful, must exploit to the maximum of his capabilities these advantages contributed by the river. He must so organize his defense that he can:

1. Keep the river under constant surveillance.

2. Call for and control the fire of artillery and other supporting weapons all along the river line.

3. Mass artillery fire at possible crossing sites, assembly areas, and approaches thereto.

4. Contain the enlargement of the enemy bridgehead and destroy it by fire or counterattack.

5. Organize and dispose his forces to insure flexibility. A rigid defense, lacking in strong mobile reserves, unable to concentrate its fire power, can be breached.

With the concept of future warfare placing greater emphasis on dispersed formations and the defense of wide areas with a minimum of troops, the importance of unfordable rivers and their defense must likewise receive greater emphasis. Their value as military obstacles will be increased in direct proportion to the skill of the defender.

The fundamental principles of war scarcely change, but are, however, influenced from generation to generation by increasingly powerful armaments and increasing mobility. I believe firmly in the doctrine which states that the battle decides all; victory in combat contributes to over-all victory.

Field Marshal Montgomery

THE WESTERN MARCH OF THE MONGOLS

Harold Lamb

This is the second of two articles by Mr. Lamb, eminent author and historian, from a chapter entitled "The Book of the Western March" in his volume, The Earth Shakers, *published by Doubleday & Company, Inc., Garden City, New York, 1949. Copyright. All rights reserved.—The Editor.*

PART II

The Ride of the Four Columns

IT WAS then February 1241—Subotai and Batu were resting their horses in the Galician plain, outside the barrier of the Carpathians, questioning the captives brought from Sandomir. Subotai has learned much from spies and the obliging Venetian merchants. He and his commanders have pieced together, out of this information, an exact picture of the lands that lie ahead of them, and the human forces gathering to oppose them. Subotai assures Batu that it will not be safe to hold the Russian plain unless this strength of middle Europe is broken.

Batu is doubtful, because they are going against odds of two and three to one, and defeat in the west would be disastrous to him.

Subotai is counting upon speed to avoid defeat. The Mongol horses can maneuver at a speed that is two to three times that of the enemy. He plans to divide his army into four columns, to break through and around the line of the Carpathians. His four columns will be able, he believes, to find and obliterate the Christian points of mobilization. In this march, or rather headlong ride, they will meet again at the point where the main European strength is gathering, at Pest on the Danube. Some of them, at least, will get there if they keep up their pace.

Because Batu is doubtful, Subotai keeps the Sain Khan with him, in command of the main body. The flanking columns he gives to the impetuous warriors, Kaidu and Kadaan. (Mangu has been recalled to Kara-korum.)

His timetable calls for his columns to arrive at the rendezvous on the Danube on March 17.

He sends the Mongols of the right-flank column off first, in the beginning of March. This is a strong division, with some 30,000 riders under command of Kaidu. It has, besides, the longest circuit to make, to the north around the great arc of the Carpathians. Here the snow is already leaving the ground.

For the first week, the flying column moves slowly, passing through Sandomir, ruined by the Mongols' winter raid. Dividing into two, it feels for the first resistance, and finds the Poles gathering to the standard of Boleslas the Chaste, with the Slavs of Prince Mieceslas.

The Mongols, in close formation, attack at Szydlow. Separating the two commands of the Polish army, they drive Mieceslas with the survivors of his Slavs to the west, while Boleslas flees south toward the mountains. This is March 18.

Kaidu pursues to the west without the waste of a day. Coming to the town of Kracow, they find the inhabitants deserting it. They storm Kracow and burn it—March 24. Throwing a bridge of boats and planks across the Oder, the column strikes into German territory, takes Breslau, and finds that resistance is forming to the north, at Liegnitz.

Here Henry the Pious, Polish Duke of Silesia, musters his Germans, with the Margrave of Moravia, and contingents from the palatinate of Kracow—about 30,000 in all, strengthened by a force of Teutonic Knights. A little to the south, good King Wenceslas—the jolly monarch of the Christmas song—is coming up with a powerful array of his Bohemians by forced marches to join Duke Henry.

With this strength confronting it, the Mongol flying column increases its pace to reach the army at Liegnitz before the Bohemians can come up.

On the morning of April 9, the Polish-German army moves out of Liegnitz to try to join forces with the Bohemians. Headed off by Kaidu's advance, it takes position on level ground. The men-at-arms, on foot, move forward against the first Mongol formation, which retires before them. Other Mongol regiments appear on their flanks, surround them and begin to cut them down with arrows.

Two divisions of Poles charge, to extricate the unfortunate infantry. They find themselves plunging into clouds of evil-smelling smoke that blinds them and conceals the Mongols. Out of this smoke appears what seems to be a great cross with a long beard—in reality the Mongol standard with the long tails. The fighting is heavy, at close range in this smoke screen, when a strange rider gallops past the Polish ranks shouting "Byegayce—fly!" The Polish horsemen draw back in confusion and are broken by a Mongol charge.

Seeing this, Duke Henry charges with his reserve of horsemen, his Silesian and Polish armored knights, and the mounted Teutonic crusaders. Mongol reserves appear on their flanks, and they are overwhelmed by numbers. Henry turns to escape with four companions, who are killed beside him. He is caught, his head cut off.

Few of the Christians survive the field of Liegnitz. The right ears of the dead are cut off by the Mongols and packed into sacks, to be counted later, while Kaidu moves on to the town of Liegnitz. Finding it deserted by its people, he burns it.

The fate of western Europe was in the balance as Subotai crossed the Danube. But the news which reached his Mongol hordes in 1242 caused them to turn back suddenly to the distant East from whence they came

Wenceslas and his Bohemians hear of the catastrophe while they are still a day's march distant. They turn back hastily, taking up a position in the defile of Glatz, in the hills to the south.

The Mongols reconnoiter this position and find it too strong to attack. After resting their horses, they move slowly aside, into Bohemia, destroying the towns in their way.

When he learns of this, Wenceslas hastens back to defend his homeland. But the movement of the Mongols is only a feint. Turning about, they quicken their pace, and pass through the defile of Glatz unopposed, heading into the fertile valleys of Moravia. Before an army can be gathered to defend it, Moravia is overrun and sacked by Kaidu's riders, who keep on, down to Hungary.

The good Wenceslas of Bohemia writes to Frederick, the German Emperor, that he has driven away the "Tartars."

In the space of a month, this northern column has covered more than 400 miles, fighting two decisive battles, destroying four cities, and breaking up all resistance in Poland and Silesia from the river Vistula to Liegnitz. And now it forages through the valleys of Moravia, watching the Bohemian army, and waiting for orders from Subotai.

"Know," Ponce d'Aubon, Master of the Templars in France, writes to his lord, the saintly Louis of France, "that the Tartars have destroyed the country that was of Henry, the Duke of Poland, and killed him with many of his barons, and six of our brothers, with three knights and two sergeants, and 500 of our men-at-arms. Three of our brothers escaped.

"And know that all the barons of Germany and the clergy and those of Hungary have taken the cross to go against the Tartars. And if these be vanquished, by the will of God, the Tartars will find none to stand against them, as far as your land."

Now Subotai is moving, to keep to his timetable. As soon as Kaidu starts off, he releases his second column, to skirt the barrier of the Carpathians and head down along the small river March toward Pest.

This second column has a long way to go. It is mounted on fast horses, and as it goes it keeps in touch by courier with Kaidu to the north.

Then Subotai starts a third flying column, this time to sweep to the south through Galicia. Its duty is to clear the southern flank and rejoin the other divisions near Pest on March 17. It is led by Kadaan.

It also has a long way to go. Like the second column, it follows an arc like one of the pincers of a pair of ice tongs—the points of the pincers to come together at Pest March 17. It breaks up into smaller detachments to glean what forage it can in the snowbound, wooded country. It raids the towns for food but passes by the stronger castles, breaking up the small armed forces it finds in its way.

The rivers along its route through Transylvania are not yet swollen by melting snows and the spring rains. The Mongol riders discover fords if they can, or they swim the current, their horses roped together, the men swimming beside them, holding to their leather kit sacks, inflated with air. They can stop for nothing because they must cover more than 40 miles a day through snow.

The startled inhabitants of the countryside are aware only that the forests seem to be alive with pagan horsemen, passing like specter riders to an unknown destination. At least once, a bit of comedy is played out.

In the rich town of Rudan, near a silver mine in the mountains, the people see Mongol patrols filtering by. The townspeople are sturdy Germans, and they muster their men-at-arms to go out and give battle to the invaders. The Mongol detachment left to screen the town withdraws in a feigned retreat. They play their part so well that the Germans believe they have driven off the enemy.

Well content, the German men-at-arms about-face and march back to town, to celebrate their victory. Scattering through the taverns, they put aside their weapons and settle down to beer in the good Teutonic fashion. By the time they are well drunk, the Mongols come back through the open gates of the town, without striking a blow. They round up the Count Ariscald and 600 men-at-arms and take them along into the forest, giving them axes to do pioneer work.

Some towns close their gates, and the defenders line the walls to watch the Mongols—until arrows, shot from a distance by the strange horsemen, begin to strike them. Astonished, the Christians take

shelter, holding up dummies to watch the steel shafts smash through them. At times, the Mongols release a volley of arrows that rises like a cloud and descends on the people within the walls. Or they fire flaming arrows into thatched roofs before riding on.

But the southern column, forcing its way through wooded hills, lags behind the schedule.

Meanwhile, Subotai has moved with the rest of the army, the main column some 40,000 strong. He takes Batu with him, and the smaller engines, dismounted and roped to sleighs.

Ascending the barrier of the Carpathians toward the pass known as the Russian Gates, he finds the heights held by a frontier guard of Hungarians who have felled trees to block the road. The Mongol advance forces the pass but is delayed in clearing the road. On March 12, Subotai is through the heights. Taking command of the advance division, he begins the pursuit of the retiring Hungarians, and the pursuit is frightening in its speed.

Down from the pass, out into the Hungarian plain, Subotai's *tumans* gallop 180 miles in less than 3 days. On March 15, 2 days before the appointed rendezvous, his patrols reach the bank of the Danube.

On the 17th, Batu appears with the mass of the central division. And the second column comes in, feeling its way down the Danube. It brings word of the progress of Kaidu in the north, and the assurance that Subotai's right flank is clear. The third column due in from the south is still missing, but the Mongols have two columns united in front of Pest, ready to give battle to Bela and his Hungarians.

The End of the Hungarians

Bela, king of Hungary, is at that time seated in council with his barons and prelates to discuss the danger of a possible Mongol invasion through the Carpathians. They are in Pest, across the river from Buda, where their army is mobilizing, when they are interrupted by the appearance of the Count of Zolnuk, commander of the frontier guard. He reports to the assembly that the frontier of the Carpathians no longer exists—that the Mongols are here at Pest at his heels.

Subotai finds the gates of Pest closed, and he is too wise to attempt to cross the broad Danube. So he explores the country, trying to draw the Hungarians out on his side of the river.

Bela, just as cautious—startled by the appearance of the invaders at his doorstep—issues orders that no one is to venture out against the Mongols. A fighting bishop, lord of Ugolin, disobeys the orders. He sallies out with his armored riders against the detachments of leather-clad pagans who are gathering forage in the villages beyond the walls, under his eyes.

The mailed Christians charge the groups of strange riders, who drift away, apparently frightened. Ugolin and his men press pursuit with shields dressed and lances down, and find themselves sinking into marshy ground over which the lighter Mongols have made their way safely. When the Christians, burdened by their heavy armor, try to extricate themselves, they are caught under the fire of the Mongol arrows. Three of them get back to Pest, with the impetuous bishop. The rest are left dead in the swamp.

Not until April 4, when the bulk of his army has crossed from Buda, does Bela move out of Pest.

This—although Bela and his barons reck little of it—is the day after the missing left wing of the Mongols has appeared at the rendezvous on the Danube. And Subotai has heard that his flying right wing has shattered the Poles in the north. He withdraws his Mongols at a walk, to lead Bela well away from Pest.

And the Hungarian king follows as if led by the hand. The Christians have a great array, because Koloman, the king's brother, has brought up the contingents of

Slavonia and Croatia, and a force of French Templars has joined them: perhaps a hundred thousand in all—barons, bishops, knights, crusaders and men-at-arms, with a backbone of sturdy infantry. As they advance, they grow more confident.

The Mongols are barely to be seen retreating. Their main body has disappeared. Certainly they are weaker in numbers than the Hungarians, and apparently they have no desire to stand and fight.

On the 6th day, the Hungarians camp in the plain of Mohi. Ahead of them winds a swift river, the Sayo; beyond that, dark forests. To either side rise the vine-clad hills of Tokay, and wooded heights. It is the evening of April 9, and already Duke Henry has fallen at Liegnitz in the north.

The Hungarians pitch their tents in the plain of Mohi, build their fires and water their horses in the river. They are experienced men, not to be caught unawares. Their scouts push into the brush beyond the river without seeing any Mongols—only the tracks of horses are visible. A Russian captive, escaping from Batu's camp, finds his way to the Hungarians and warns them that the invisible Mongols are, in fact, camped a few miles farther on.

So the Hungarians take precautions against surprise. They are protected by wooded hills on either side. But they encircle their camp with a ring of wagons roped together. Koloman himself goes with a thousand men to the only bridge over the Sayo, between them and the Mongols. This advance keeps watch while the main body within the wagon ring turns in for the night.

Before dawn, the Mongols are in motion, returning to the river from their camp 5 miles away in the brush. One column, under Batu, approaches the stone bridge over the Sayo. The other, with Subotai commanding, makes for the river lower down, to flank the Hungarian camp.

At dawn, Batu's riders rush the bridge, and are checked by Koloman's thousand Hungarians. The Mongols bring up seven catapults and rake the bridge with heavy missiles. The Hungarians are driven back, and the Mongol horsemen come across, to deploy into the plain.

Meanwhile, undiscovered as yet, Subotai is fording the Sayo—throwing across a bridge of beams and tree trunks to aid the crossing.

In the camp, the Hungarians come out of their tents to find the strange horsemen massing on the higher ground around them. The Mongols move silently, without molesting the Hungarians, but they encircle the camp steadily.

The Hungarian cavalry goes out against them and charges in a mass. The Mongols seem to drift away before the Christian charge, closing in on its flanks and sweeping it with volleys of arrows.

Crippled by the fire that it cannot return, the Hungarian charge breaks up, sways back to the camp in confusion. By now, Subotai's column is coming up, closing the circle about the camp where a multitude of armed men is elbowing about restlessly, hungry, bewildered, staring at the ranks of dark horsemen closing the avenues of escape from the camp. The Mongols open fire with volleys of arrows from the higher ground upon the Hungarians.

Again the Hungarian leaders, Koloman and the adventurous Ugolin, rally their mounted men to charge out of the wagon ring. But few of them are willing to follow them this time. The Templars go out to a man. And again, they are cut to pieces and herded back, without the Templars, who died fighting.

The multitude in the camp is unsteady now, with no leadership to direct it. Bela, unskilled at soldiering, is helpless—Koloman wounded. Then the Mongols move down the slopes, firing flaming arrows and naptha into the close-packed Hungarian ranks. At the same time, the ring of horsemen opens, toward the west, where

the level plain runs back to the Danube. The Hungarians move toward the opening uncertainly. The first of them get through the opening without harm. Then they begin to run.

They lose all formation as they press through the tents toward safety, cutting the tent ropes to clear a way. Bela thinks at first that his army is advancing on the enemy; then, seeing the retreat, he joins it.

The Mongols cease firing and draw back, allowing the Hungarians to march out unmolested. They move on either side, at a foot pace, waiting.

Nearly a hundred thousand men are pushing toward safety, and their leaders cannot stop them now. It does not matter that safety lies beyond the Danube, 6 days' march away. They push toward the opening in the ring of horsemen.

For 2 days, the slow and terrible flight lasts. The Mongols, waiting until they see men exhausted, ride in and kill them like sheep with their hand weapons. Some of the Hungarians are herded into swamps, to be killed more easily. Bela, unrecognized, escapes by the speed of his horse.

Bodies are heaped up on the ground for the space of the 2 days' march. Seventy thousand, it is said, die there, with Ugolin and two archbishops and the greater part of the Hungarian nobility. The survivors are fugitives, hunted through the hills, drugged by fear. Bela's flight ends in a monastery in the higher Carpathians, where he finds his fellow monarch of yesterday, Boleslas the Chaste, also a refugee.

The wounded Koloman, passing through Pest, warns the inhabitants to cross the Danube and escape to the west if they can. Instead, they try to defend their city. It is stormed and burned by the Mongols, and its people slain.

"However great their multitude may have been," the chronicler Thomas of Spalato wrote of the Germans and Hungarians, "still greater in that battle was their hardihood. But no people in the world knows as much as the Mongols, especially in warfare in open country, about how to conquer an enemy either by daring or by knowledge of war."

The battle on the Sayo had an aftermath in a *kuriltai* on the other side of the world. Batu reproached Subotai, saying, "When we fought together near the river Danube, I lost my friend Bahatu and 30 men by your fault, for you were late in reaching the battle."

"You know well," Subotai answered, "that where you crossed, the river was shallow and you had a bridge already built. You have forgotten that where I crossed the river was deep, and I had to build a bridge."

Batu admitted that Subotai was right in this, and he yielded credit for the victory over the Europeans to the old Mongol general. He took for himself, however, the royal pavilion that Bela had abandoned on the field of Mohi—its splendor appealed to his taste for luxury.

Europe, in the Summer of 1241

Kaidu, hearing that the campaign in Hungary was won, came down with his column. On the way, he made a feint at the mass of Bohemians of good King Wenceslas and the armed host of the Duke of Saxony. He took and burned the city of Brunn. He called in the flying division which had been thrown out on his right flank and had swung far north through the Lithuanians and Prussians, almost within sight of the Baltic. Then he rejoined Subotai and Batu on the Hungarian plateau.

There the grass was fresh, and the Mongol horses could find good grazing. Subotai gave command to rest and to complete the occupation of Hungary. The Mongols would use the Hungarian plain for the base of their next advance, as they had used the Russian Ukraine in the last summer.

In 4 months—Kiev was taken December 6—his commands had overrun middle Europe from the Dnieper to the Vistula near the Baltic. In 2 months, he had conquered the lands from the Carpathians to the Danube. Within 3 days, his columns had annihilated the armed forces that warlike Poland, Hungary, Brandenburg, Saxony, Silesia, and Bohemia had put in the field against him. Their fortresses were obliterated, their cities burned and villages sacked.

His Mongols had been heavily outnumbered, yet they had suffered so little loss of life that their divisions were intact, and they were ready for the next advance against the Germans and Italians. The Mongols had accomplished this by their discipline and speed of movement, and by the brilliant handling of their leaders.

In this disastrous invasion of the winter of 1240-1241, the people of Europe, not the horsemen from the steppes, were the true barbarians.

For dread of the invaders seized on Europe. The shock of the disaster seemed to affect the westerners like some unlooked-for catastrophe of nature. They could not understand it.

Their feudal lords and the church dignitaries had been swept aside like men of straw. Their will to resist had been broken.

"A great fear of this barbaric race spread even into far-off lands like Burgundy and Spain where the name of Tartar was unknown until then." As far as the North Sea, this dread made itself felt. Danish herring fishers failed to put to sea that year, and the price of herring went up accordingly in England.

The Mongols had appeared at so many points within those weeks that the Europeans fancied they must be as numerous as some vast horde. The destruction they caused could only be explained, in European minds, as an act of God's anger.

The good queen-mother of France demanded of her son, the saintly Louis, "My son, what wilt thou do?" And he answered with true piety: "The heavenly consolation remains to us that when the Tartars come, we will either drive them back to Tartary, or we will be elevated ourselves to the blessedness of the chosen souls."

Refugees who had escaped from the ruins of towns made their way west, babbling of deserted habitations and men surviving like animals in the hills.

In Paris, the monk-chronicler, Matthew, entered a record in his huge book: "Swarming like locusts over the face of the earth, they have wrought terrible devastation to the eastern parts, laying it waste with fire and carnage. They are inhuman and beastly, rather monsters than men, thirsting for and drinking human blood. They are without human laws, knowing no comforts—more ferocious than bears."

Matthew of Paris had all the ardent imagination of a writer far from the scene of battle. But a more curious and discriminating mind echoed his thoughts. Frederick of Hohenstaufen, then Emperor of Germany, addressed a warning that was an appeal to "France, that nurses an intrepid soldiery, to warlike Spain, to England, powerful in its men-at-arms and ships. . . .

"A people," Frederick said, "issuing from the uttermost parts of the world, where they had long been hidden under a frightful climate, has suddenly and violently seized upon the countries of the north, and multiplied there like grasshoppers . . . . It is not without a manifest judgment of God that they have been reserved . . . . as a chastisement for the sins of men and, perhaps, for the destruction of Christendom.

"This ferocious and barbarous nation knows nothing of the laws of humanity. They have, however, a chief whom they venerate, and whose orders they blindly obey, calling him the God of earth. . . . At the least sign from their chieftain, these

men rush with impetuous valor into the midst of perils. . . .

"Up to the present time, they have had no other armor than rough and ill-joined plates of iron. But already—and we cannot utter it without a groan—they are beginning to equip themselves better from the spoils of Christians; and soon the wrath of God will perhaps permit us to be shamefully massacred with our own weapons.

"The Tartars are mounted on the finest horses, and they now feed on the most dainty meats, and dress richly and with care. They are incomparable archers."

Frederick, head of the Holy Roman Empire, and closest to the line of the Mongol advance, was the one to urge an alliance of the European princes against the invaders. He was the temporal head of Christendom, as the aged Pope, Gregory IX, in the Lateran palace, was the spiritual head. Together, they could have collected forces that might have withstood the Mongol attack. Refugees from the conquered area were crowding into the valleys of Bohemia, and into northern Italy, while the luckless Bela sent appeals for aid from his hiding place to both courts.

But the pope and the emperor were locked in their long strife for supremacy. Frederick, aware of the peril of the Mongol advance—"Of those matters we have been informed for a long time," he observed, in June 1241—suggested a truce. The papal powers would have no truce.

Gregory made the gesture of allowing a crusade to be preached against the Mongols—he had already preached a crusade against Frederick—and said that he grieved for the Hungarians. His Welfs spread the rumor that Frederick's envoys had been seen among the Mongols, and that the Emperor himself must have summoned the invaders into Europe.

With the papal forces determined to carry on the civil war, Frederick refused to move against the Mongols. "If I march against the Tartars," he said bluntly, "I will expose my own states to attack. . . . After pacifying Italy, I will march against the invaders."

To the envoy of Bela who besought him for aid, the aged Gregory answered: "If Frederick who calls himself emperor returns with a contrite heart to obedience to the Mother Church . . . that will allow you to be aided."

And Matthew of Paris lamented: "Great was the anger of God towards the Christians to permit such feuds to be."

In July, Frederick wrote to his brother-in-law, Henry III of England: "If the Tartars penetrate into Germany and find no barriers to their progress there, other nations will suffer from the terrible scourge . . . . Use your diligence, therefore, in giving aid, for this people (the Mongols) have left their own country intending to subdue all the west, and to destroy the faith and name of Christian."

The summer was passing, without an adequate defense being prepared against the Mongols. Two Swabian barons, obedient to Frederick, led a force of some 4,000 men-at-arms eastward, and checked an exploring detachment of Mongols. Yaroslav of Sternberg brought 500 Bohemians to the defense of the strong city of Olmutz. Sternberg, an experienced captain, kept the people of Olmutz within the walls, and kept the Mongols out—making one sortie at night and killing a number of the invaders. But the Mongols made no attempt to besiege Olmutz.

Then, in August, the aged Gregory died, leaving Europe without a pope. The conflict between the religious and the civil power ceased in Italy.

Meanwhile, the Mongols began to assemble their commands to resume their march westward across the Danube, with no European army in the field to oppose them.

The "Carmen Miserabile"

During the summer, the Mongols had regained their strength in the high valleys

of Hungary, replenishing their horses on the *puszta*, and making the most of the rich grazing. This, like the Russian plain, was a country well suited to their needs. And they found the Magyars to be descendants of Turkish nomads, speaking a language akin to their own. They were joined by the Kipchak tribesmen who had watched the annihilation of the Christian armies and were ready now to make submission to the victors.

Meanwhile, Batu had been doing some more letter writing. His men had found the state seal of Hungary on the battlefield of the Sayo, and the Sain Khan concocted with his interpreters a forged missive in Hungarian that he stamped with the royal seal:

"Do not fear the rage and savagery of these dogs," his letter ran. "And take care not to quit your towns. Although WE abandoned our camp because WE were taken unaware in it, WE expect with the aid of God to retake it soon, sword in hand. Content yourselves then to pray to God that WE may be permitted to vanquish our enemies."

This was signed by the Mongols with Bela's name and circulated among the Hungarians. It helped to keep them quiet in their villages where the Mongol patrols could get at them more easily. These patrols were scouring the countryside, methodically rounding up the cattle and horse herds, assembling captives in bands and putting them to work. The greater part of the peasantry they left unmolested in the fields at that time, because they wanted the crops cultivated and the harvest gathered in. From Moravia to Transylvania, the same systematic garnering of supplies and liquidation of the people went on.

A certain Roger, canon of Varadin, left an account of his hide-and-seek with death that summer, in his *Carmen Miserabile:*

"While the Tartars sacked Varadin," Roger relates, "I hid in a neighboring forest. I escaped that night to Pont-Thomas, a German town on the river Koeroesch, and, thinking myself still in danger, I left there to take shelter in a fortified island in the river. When I heard a little later of the sack of Pont-Thomas, I saddled the horses again, and left the island, turning aside into a forest.

"The next day, the island was occupied by the Tartars, who cut down all they found alive there. Several of the people escaped into the wood along the bank. After 3 days, thinking that the enemy had gone off, they went back to look for food. But they were found and massacred by Tartars hidden in the houses.

"After that, I wandered in the forest without any supplies. Hunger forced me to go back at night to the island, to search among the bodies. I carried off cautiously some meat and grain hidden in the ground. For 5 days I got along in this way, hiding in daylight in ravines and the hollows of trees.

"When the Tartars promised not to harm any people who went back to their homes, I did not put any trust in their words. I decided it would be better to go into one of their camps than to try my luck in a village. I gave myself up to a Hungarian who had gone into the service of the Tartars. As a great favor, he consented to let me join his own servants.

"While I remained with him, half-clothed, taking care of his wagons, I looked on death every day. One day I saw a large number of Tartars and Kipchaks coming in from every direction with carts loaded with spoil, driving great flocks and herds in front of them. I found out that the night before they had killed the people of all the villages around there. They had not burned the grain, or the fodder, or houses. That made me think they meant to pass the winter in the neighborhood, and my guess was right.

"They had only let the villagers live long enough to get in the crops and cut the hay. They had not waited until these unfor-

tunates began to use what they had gathered in.

"After that, the pagan princes ordered us to leave the country, and we all began to march off with the horses, the herds, and the wagons loaded with booty. . . .

"The army, retiring slowly in this manner, emerged from the forests to find a multitude of other Tartars and captives waiting in camps already prepared. Leaving Hungary behind, the united army entered the country of the Kipchaks. Now it was not allowed, as before, to kill cattle for meat for the captives. We were only permitted to have the intestines and the hoofs and heads of the beasts which had been slaughtered to feed the Tartars. We began then to be afraid that they meant to put us to death—the interpreters admitted that this was so.

"I thought over how I might escape. Pretending to leave the road to empty my bowels, I plunged suddenly into the brush. My servant followed. I made my way into a deep ravine, and covered myself up with boughs—my servant hiding not far off.

"We stayed stretched out like this, as if we were in our coffins. For 2 days we did not dare raise our heads. We listened to the harsh cries of the Tartars who searched out animals in the wood, or called to captives who had hidden themselves. Finally the ache and hunger forced us to come out of our hiding. . . .

"Strengthening ourselves by our trust in God, we went out to the edge of the wood and climbed a high tree. We saw that the open countryside, untouched by the Tartars on their arrival, was now utterly desolate. We started out across this barren land, where the bell towers of the churches guided us, and we were happy if we found any onions or garlic in the garden of the ruined villages. Otherwise, we had to subsist on roots.

"Eight days after leaving the wood, we came to Albe. There we found nothing but human bones, and the stain of Christian blood on the walls of the palace and the churches. Ten thousand paces from there stood the country house commonly known as *Frata*, near a forest. Four miles within the forest we came to a high mountain where many refugees, both men and women, had gathered. . . .

"They gave us some black bread made of meal flavored with dog's flesh which seemed to us the most delicious food we had ever eaten. We stayed a month in this place, not daring to leave it. But we sent out often to try to find men farther off, to learn if the Tartars had not remained somewhere in the country. For we feared always that their withdrawal was only a pretense, and that they would return to kill those who had escaped their savagery. Although the need of food forced us to go down continually to the villages that had once been inhabited, we did not leave our refuge, actually, until after the return of Bela, our king."

Roger's story was that of a half-million survivors of the invasion. And by degrees, these men, physically weakened by hardships, began to lose hope of resistance. They understood that it would be useless. Instead, they began to have a gray and terrible hope that they would survive under this strange yoke of the pagans. The slaughtering ceased when resistance ended. Roger himself relates that after his return to human habitations he and his fellow refugees found "peace and a market, and a judge to decide disputes."

The Mongol *darugashis* were at work. The census takers were tabulating the resources of Hungary. Like Russia, the Hungarian plain was being made over for occupancy by the steppe dwellers. The Bulgars and Kipchaks were being taken into the *ordus*, like the Georgians and Armenians of the Caucasus. Mongol coins began to circulate in the markets.

And the Hungarians were coming to know their strange masters a little better. They realized that talented men—artists

and goldsmiths—were being expressed to the east, to a place called Kara-korum, along with the captured treasures. The more attractive girls fared well as prostitutes.

The Mongols no longer destroyed churches. For the walled monasteries and cathedrals had been centers of resistance, and they had been burned in the attack because burning was the simplest way to get rid of them. True, commanders of the Christians had been put to death in an unusual way, being suffocated in felt cloth. But this was because the steppe dwellers did not desire to have a brave man lose his blood. They wanted him to serve them.

Wealthy captives were tortured at times, to make them confess where they had hidden their riches, whether real or imaginary. This practice, Rogers and his fellows knew, was not confined to the Mongols in that age.

It became increasingly clear to the Hungarians that so long as they paid the tithe to the invaders—and the agents of the Mongols provided them with coins to pay this tenth—and served in the requisitioned work, they could enjoy peace, if not security. It was the first experience of western peoples with the nomad peace that forbade conflict between the subjects of the great Khan.

After what they had witnessed, Roger and his mates were slavishly willing to obey commands. They whispered among themselves that if a man obeyed, he was safe.

Not so the Poles and Germans. For it was the custom of the Mongols to preserve everything that might be useful to them in the conquered area, even to the carts and human beings—but to obliterate life in the next zone that resisted them. In this way, they created an artificial desert along their frontier. This devastated area would not sustain an army, they thought, advancing to attack them.

Although the Hungarians did not realize it, they were being taken into the Mongol yoke, while the zone destined to be destroyed would be immediately east of them, across the Danube.

A strange tenacity, this—a survival of the nomad instinct to safeguard themselves against the unknown forces of the world. These steppe dwellers of a generation before were appropriating everything that might be useful to them, and drawing it homeward with them, as beavers drag sticks to a dam. They were taking, not gold or gleaming jewels, but the linens woven in Europe, and the best iron, the brains of educated men. And they prayed that they might have the souls of the talented dead!

The steppe dwellers were moving stubbornly, and at the moment irresistibly, toward the sun.

When he received a summons from the Mongols to submit, Frederick laughed and said that he might be qualified to serve as keeper of the great Khan's falcons.

Ice on the Danube

At the end of autumn, frost gripped middle Europe. Snow began to close the roads over the mountains. The harvests were all stored under roofs. And Subotai was ready to begin the winter campaign.

He chose the winter, as in Russia, because the larger rivers could be crossed on the ice, and because hostile mobilization would be hampered by the snow. But he moved slowly, his eyes on the west. No armies, apparently, had gathered there to resist him—certainly his occupation of the Danube had gone unchallenged. And when puzzled, he became cautious.

He thrust out two columns, one to the north, under Batu, the other toward Venice, under the young *tuman-bashi*, Kadaan—the same who had commandeered the six hundred drunken Germans at Rudan that spring.

Faced by the icebound Danube, Batu made a test of the ice without risking his own men on it. His advance guard drove a

large herd of cattle down to the edge of the river and withdrew, leaving the animals there. After 2 days, the Europeans on the other bank ventured to cross, to gather in the great herd and drive it to their side of the river. And Mongol scouts, watching from the heights, saw that the ice held this multitude safely. Whereupon, on Christmas Day, as it happened, the Mongol horsemen rode across it.

They headed toward the great city of Gran, where French and Lombard merchants gathered with the citizens behind the wooden walls, instead of evacuating the place. Bringing up 30 catapults, the Mongol engineers battered a way through the walls, and Gran was taken before its people realized the siege had begun.

The merchants set fire to their wooden warehouses, but the Mongols, angered by this destruction of useful goods, burned them over slow fires to make them confess where they had buried their other valuables. Three hundred noble-born Austrian and Hungarian women were taken in one building. They put on their court garments and asked to be brought before Batu—pleading with him that they were willing to become slaves and serve the Mongols. Instead, Batu ordered them to be stripped and then killed—their rich garments, unstained by blood, were carefully preserved.

With Gran smoking behind them, the Mongol advance guards circled Vienna and pushed on as far as Neustadt. They were checked by an army of Bohemians and Germans, and Batu turned south to join Kadaan—Subotai remaining on the Hungarian side of the Danube, with the mass of the Mongols, waiting for the German or Italian armies to materialize in force.

One detachment passed along the edge of the Tyrol, as far as Udine, at the end of the Adriatic, within a short distance of the Venetian lagoons. The Mongols were filtering through the new line of defense, as they had penetrated Poland in February, feeling for the centers of resistance.

Meanwhile, Kadaan had been pursuing a monarch. The Mongol spy service had discovered that Bela, king of the Hungarians, had survived the holocaust at the Sayo. And by Mongol custom, the ruler of a hostile nation was to be put to death.

The list of their executions was by then a long one—from Wang Khan of the Kiraïts to Gutchluk of Black Cathay, and the Golden Emperor, to Muhammad the Khwaresm-shah and Sultan Jelal ad-Din, to the Volga chieftain Kutchman, and the Grand Prince Yuri of Riazan, and Henry of Silesia. Some of these had been hunted down for months, but no one had survived.

Bela had moved from his monastery in the Carpathians to the Austrian court. He fled thence to the Dalmatian coast, in February 1242. The Mongol hunters traced their quarry down to the shore. Bela fled out to sea, to one of the islets along the coast. This checked Kadaan—his horsemen were not familiar with such a great expanse of water, over which they could not swim their horses—until he commandeered other ships and began to search through the islands. Frightened, Bela had himself transported back to the coast.

Kadaan picked up his trail again there and began to work down the coast, slaughtering the small army of captives he had brought with him from Hungary when they hindered his march.

First, Bela sought refuge in the fortress of Clissa. Then, hearing of the approach of the Mongol horsemen, he rode to Spalato, where nobles of the Hungarian court had flocked. Fearful, even in that strongly defended port, he fled on to Trau.

Kadaan's advance appeared before Clissa and fired a volley of arrows into it before dismounting and climbing to the assault. Learning that Bela was no longer within its walls, the pursuers went on to Trau. There they sent a messenger who spoke Slavonic into the town.

"Kadaan, a lord of the unconquered army, bids you know," the messenger an-

nounced, "that you will share the punishment of one who is not blood kin to you, if you do not yield him into our hands."

But Bela had taken to the sea again, sailing out to a small island off Trau, where the Mongol horses could not follow him.

Kadaan ravaged the coast to the south, and his men attacked the ships that had escorted Bela out, when they were driven ashore by a storm.

Beyond the Danube, Subotai waited, ready to move into western Europe at the first appearance of a hostile army. Then, at the end of February 1242, a courier from the other side of the world reached the camp of the old Mongol general, and put a stop to all operations. The courier carried a gold tablet of command, and the message he brought to Subotai was this:

The Night at the Blue Lake

More than 4,000 miles away, the Khakhan, Ogadai, had lingered in his summer quarters by the Blue Lake where the waterfowl gathered. The wild geese, abandoning their summer haunts in the tundras, passed south, crying out. Clouds of sand grouse swept by, on the heavy winds, between the gusts of hail. And Ogadai drank in his gold-studded pavilion. Even after the first flurries of snow, he stayed at the lake to hunt. At times, after a drinking bout, he lay speechless and weak. But he would not follow the birds toward his winter palace.

His elder brother, Chagatai, was no longer at his side. Chagatai—the Wild Horse—was feeling his age. A nomad at heart, he kept to his mountains in mid-Asia. He had opened new roads through the ranges, winding down to the Five Cities, joining the different Mongol dominions together. His granaries were full. His people kept to the Yasa of Genghis-Khan. With nothing to concern him, Chagatai built artificial lakes by his mountain camps, so that like Ogadai he could watch the bird life gathered there. And he listened to the messengers from the western army telling of the fortunes of his warrior son and grandson, Baidar and Bouri.

Then too the Wild Horse had fallen under the influence of a wizard who could subdue the spirits of the high and distant places, and invoke the stars—a wizard named Sakaki. . . . Sakaki was careful to keep the old Mongol away from his brother's court . . . .

The burden of administration in the east had fallen upon that wise Cathayan, Yeliu Ch'u-tsai. With Ogadai ailing, his task was doubled, and he had little time now to play the dozen lutes that were his hobby, or to write verses to his confreres. He had to struggle against plausible strangers who came to Ogadai's feet with schemes for aggrandizement and still more fabulous profit.

And he had to tread, with great care, a middle ground between the ideas of the elder Mongols and Turks, who believed in government from the saddle, and the growing Chinese element that sought to convert the Mongol khans to the ritual of the Chinese empire.

On the nomad Mongol side, Turakina, the favored empress, was gaining the ascendancy—because Ogadai was still patient with her whims. And Turakina saw no reason why the Mongol court should not wax more wealthy—herself the fountainhead of the new prosperity. She was partial to a shrewd Moslem, Abd ar-Rahman who pledged himself to collect two million ounces of silver yearly from the conquered areas in China, if he could be given the tax administration that was in Yeliu Ch'u-tsai's hands.

Against Abd ar-Rahman's scheme, the Cathayan argued passionately, knowing what grinding oppression would come to the Chinese with the farming of the taxes.

"Are you trying to stand against us," Ogadai demanded fretfully. "Do you weep for those people?"

"I weep," Ch'u-tsai replied, "because the misery of the people begins from this moment."

When Ogadai lay on his couch in the Golden Camp, without rising, Turakina came to Ch'u-tsai's quarters to ask how the government was to be carried on, with the great Khan lying helpless.

"For 30 years," the Cathayan answered, "I have carried it on, by doing what was reasonable and punishing what was wrong. The Khakhan trusted those affairs to me."

"But now that he is ill," Turakina suggested, "new edicts are needed."

"Without a decree of the Khakhan, nothing can be altered."

The Cathayan would concede nothing to her growing insistence, or to the whispering of her adherents. Ogadai recovered a little as winter settled down on the steppes. But he would not leave the tent camp for civilized quarters. And against Ch'u-tsai's urging, he rode off to hunt again.

When he mounted his horse, a Mongol shepherd came to his stirrup, to complain of a wolf that had been killing sheep. Hearing that, the Mongol beaters assembling around the Khakhan carried up to him a wolf they had just trapped and bound. For a moment Ogadai stared at the great beast twisting in its cords.

Then he ordered a flock of sheep to be given the shepherd as a reward, and on an impulse of his own he told the beaters to release the captured wolf.

"I will let him go," Ogadai said gravely, "so that he will go back to the other wolves of the pack and warn them of the danger that came to him. Thus, they will all leave the countryside."

Those who heard Ogadai did not know if he were still drunk, or if a whim had seized him. They freed the wolf and let it go—only to see it seized by a pack of dogs before it could get clear of the camp. The dogs killed the wolf.

Ogadai seemed depressed by this happening. Dismounting, he went back into his pavilion and was silent a long time. He refused to think of hunting. "My strength fails," he said at last. "I thought that the Sky might be willing to let me live longer, but I see now that no one can run away from his end. It is not a good omen for me."

He took to drinking again, in his couch. At the beginning of the twelfth moon, he sat late one night to drink with two companions, one being the sister of Siyurkuktiti, the other her nephew who had come on a visit from Cathay. Ogadai welcomed them, and emptied cups of hot and cold wine with them. That night, he died in his sleep.

At daybreak, when other women found Ogadai's body, the wailing began, and accusations against the two who had sat with Ogadai in the night. Some said that Siyurkuktiti's sister had poisoned the Khakhan.

Llchidai Noyan, a powerful chieftain of the Jelairs, spoke against this.

"What scattered words are these?" he exclaimed. "The Khakhan hath ever drunk too much of wine. Why, then, should we give our Khakhan a bad name, saying that he died at the hand of another? For his hour was upon him. Let no man speak such words again."

The Mongols who heard Llchidai nodded their heads in agreement. Ogadai, their Khakhan, had ascended to the throne seat of empire, they remembered, in the year of the Ox, and now that 12 years had passed, he had died in that same year of the Ox. It seemed fitting enough.

As their custom was, they kept the news a secret. That daybreak, when Ogadai lay lifeless by the Blue Lake, orders were given to close the post roads. No merchants or strangers were allowed within the gates of Kara-korum; no Mongol could leave the Blue Lake encampment except the couriers who carried the tidings to the blood kin of the Golden Family. Travelers on the roads were halted at the stations, and the couriers went through on racing horses. One quested for and found Kuyuk, loitering

near the Gobi; another, with a gold tablet that gave him the authority of a khakhan, galloped across Asia in midwinter, sleeping in the saddle as he went, to carry the tidings to Subotai and Batu.

Ogadai had died on the eleventh of December 1241. The courier arrived at Subotai's quarters on the Danube late in February. He had covered nearly 5,000 miles of snow trails in 2 months and a half.

And this courier brought a summons to Batu and the chieftains of the house of Genghis-Khan to ride back to the Mongol homeland, to a *kuriltai* of the blood kin. To disobey such a summons was, to Subotai, unthinkable.

Now it was Batu's turn to object. Ogadai's death had been a release to him. By it, the bastard's son had become the eldest of the house of Genghis-Khan—for Chagatai was aged, his health broken by heavy drinking. More than that, Batu commanded the victorious army of the west. His domain had grown with each yearly campaign. He had no desire now to quit the Danube to journey back to Kara-korum to help elect one of his cousins of the house of Ogadai to the great Khan's throne. Certainly not Kuyuk, who had called him an old woman with a beard. Batu wished, therefore, to carry on the war. Had not that been Ogadai's command?

Subotai, indifferent to politics, answered that the *Yasa*, the word of Genghis-Khan, summoned them to the homelands. He thought no more of his own ambition to penetrate beyond the Danube. Back they must go. And he ordered the evacuation of Europe.

Kadaan was called off from his man hunt. The great Ordu about-faced and began the slow march eastward to the steppes. But Subotai took pains to make the Europeans understand that this was no retreat.

To screen his movement, Kaidu was sent with a flying column, to circle Vienna and carry off loot from the Germans. As they went, Kaidu's riders proclaimed, "We are called away, and we spare the Germans war."

The Mongols decided to abandon the Hungarian plateau zone. They stripped that plain of its herds, driving the cattle eastward. This zone, in which they had been settling, was to be turned into a desert. Kadaan's army was ordered back through the Balkans—to crush the Serbs and Bulgars there. In its passing, it burned Belgrade and compelled the Bulgars to become tributaries of the Khakhan. Then it rejoined Subotai in the Russian steppes.

Their new frontier was to be the end of these grasslands, at the line of the Balkans, the Transylvanian Alps, and the Carpathians. With their wagon trains, they disappeared into the east. Europe had been granted a truce.

What would have happened if Ogadai had not died? Would western Europe have escaped the Mongol yoke?

This much is certain. Subotai had come into contact with the German military power, and it was part of the Mongol plan of conquest not to leave a defiant enemy uncrushed. It is clear, also, that the steppe dwellers felt little desire for the hilly country beyond the Danube, with its small valleys and rivers. They had been drawn toward the steppes of Russia, the Polish plain, and the Hungarian plateau.

That they would have destroyed Frederick and his war bands, there can be no doubt. And the French chivalry, led by the hapless Louis, might have fared no better. The European monarchs had proved themselves incapable of acting together. In numbers and individual bravery, the Europeans were at least the equals of the Mongols, but they had shown themselves helpless before the maneuvering of the Mongol cavalry divisions, directed by a strategist like Subotai.

As it was, Subotai's campaign had a decisive effect on the growth of eastern

Europe. His armies had decimated and scattered the western Slavs and Magyars. The zone around Hungary had been half depopulated; crops had not been sown that summer, and famine and typhoid thinned the surviving peoples. On the other hand, the Germans beyond Bohemia had escaped with little harm. Districts like Silesia and fertile Moravia were repopulated in time by German settlers.

Teutonic Austria gained the ascendancy over the sadly mixed survivors of Hungary. The Turkish element in Europe—Bulgars and Kipchaks—were driven into that refuge of minorities, the Balkan mountains, or they were drawn into the orderly mass of the Golden Horde, in the steppes.

By this upheaval of peoples, the Mongols changed the racial map of that part of Europe, not by interbreeding. The steppe dwellers avoided settling in those lands; they were still nomads by temperament, and they withdrew with their gleanings from the captured lands, leaving almost no descendants there. The children of the women they took east with them grew up in the steppes.

For Batu withdrew to the Volga banks before settling down with his Golden Horde.

In their retreat, the Mongols disappeared from the ken of the Europeans. The westerners, in that summer of 1242, were left stunned. They felt helpless and uncertain. They asked themselves who the "Tartars" were, and whither had they gone. What purpose had brought them out of the east? When would they strike again? The eastern churches inserted a new prayer in their litany, to be "delivered from the fury of the Tartars."

A new Pope, Innocent IV, coming into the Lateran, warned the Europeans to fortify themselves against the Mongol peril. He heard that the pagan invaders had appeared north of the Holy Land. And that Russia was no more. He advised his peoples to obstruct all roads leading into the east. And he sent his missionary friars after the retreating armies, toward the unknown empire beyond the steppes, "to exhort them from ceasing to slaughter mankind."

But at the same time, merchants like the Polo brothers began to explore the caravan routes beyond the ruins of Kiev, to resume their trade with the pagans.

Batu stopped at the line of the Volga, where the courts of his 26 wives awaited him. All his life, he had been little better than an exile from the Golden Family. Now he had under his gilded domes the spoils of the European war; he had a domain that was a sea of grass; he was safe from any enemy, with food enough to keep his people from hunger indefinitely. He reigned, a Sain Khan in truth, over an empire more suited to the nomads than Cathay. And he made up his mind to do something unheard of.

He told Subotai that he would not go to the *kuriltai.*

"You are the eldest prince," Subotai said. "It is not wise to refuse."

Batu made an excuse—the gout in his leg kept him from going.

"The great ancestor said," Subotai reminded him, "that those who do not appear at the gathering of the blood kin will be like arrows shot into reeds. They will disappear."

Then Batu agreed that he would make the journey east. But when Subotai departed with his followers, the Sain Khan did not come after him. Instead, he sent word that his gout was worse and he could not come.

The *kuriltai* was held without him.

Use of Student Reaction Questionnaires at Service Schools

Major Edward L. Adams, Jr., *Infantry* (Reserve)
University of Minnesota

IN RECENT years, a trend has developed in many fields which has added objective analysis to the judgment of experts as a basis for the determination of new policies. No longer is it considered enlightened to declare, "We will proceed along certain lines because I (an expert) consider them to be proper, or because we have always done things this way in the past." Rather, the new approach says in effect, "We will reserve judgment concerning the proper methods until we have obtained objective evidence on the situation at hand."

Physical scientists have long subjected themselves and their work to this rigorous discipline. Other fields have gradually come to depend increasingly upon this method until today industry, large businesses, governmental agencies, and many other groups hesitate to make important decisions before reinforcing subjective opinion with the type of objective analysis appropriate to their particular problem.

One of the most widely used techniques of analysis in fields where human variables are involved has been the questionnaire. These fields recognized that the effectiveness of their techniques depends in large measure on the degree to which they are accepted by the people who are subjected to them. The next step logically is to find out what such people want and how they react to what they are getting. Only when such information has been secured and considered along with other factors can the experts make justifiable decisions regarding future policy. The hypothesis appeared tenable that this experience in other fields might be applicable in military education.

Study Made at C&GSC

In the spring of 1948, the Command and General Staff College, as a part of its program to maximize the effectiveness of instruction, decided to investigate the value and uses of questionnaires in military education. In accordance with this purpose, a letter of inquiry was prepared and sent to service schools throughout the country. Such schools were asked whether they had used questionnaires, and if so, how they had been used and if they considered them to have been of value. They were also requested to send copies of questionnaires currently in use and examples of pertinent findings. Eleven schools responded to the request with varying types and amounts of information. All of these claimed experience with questionnaires, and in answer to the question of how useful such instruments had been to them, replies ranged from "of little or no value" to "very helpful." The following schools were represented:

Air University	Infantry
AA and Guided Missile	Ordnance
Armored	Quartermaster
Chemical Warfare	Signal Corps
Engineer	Transportation
Ground General School	Center

Examination of the questionnaires submitted indicates that, with one notable exception, comparatively little attention has been devoted to their construction. Items were of a general nature and rarely pinned the students down to specific alternatives for a well-defined situation. Unstructured responses to this type of items are extremely difficult to tabulate and analyze. While they can serve a useful function by occasionally providing valuable new ideas and by giving a rough indication of the type of alternatives to be supplied in a future questionnaire, they make it almost impossible to secure a representative measure of the degree to which students accept or reject a given practice, condition, or personality. On the other hand, in most of the questionnaires where some attempt was made to structure the response, the choice offered was too limiting. In other words, students were frequently required to choose between "Yes" and "No" in situations where a much greater range of responses would probably have given a truer picture.

While the use of questionnaires in military education is subject to a number of limitations, experience shows that they can provide types of valuable information which no other instrument can provide as well

With respect to the uses of questionnaires, nearly all schools indicated that they consider student reactions when making changes in materials and methods, but emphasized that this is only one of many factors which are considered and that student reaction is not a sufficient reason for making any change. No statement appeared regarding the statistical methods employed in evaluating questionnaire data or in determining what constitutes a sufficiently significant student reaction to warrant serious consideration.

Characteristic Faults of Questionnaires

During the summer of 1948, the results of the above correspondence, as well as a trial questionnaire which had been administered to the 1947-1948 regular class at the Command and General Staff College, were subjected to careful examination by the Department of Analysis and Research. Since it was apparent from both sources that results had been inconclusive and generally disappointing, attention was next directed to whether the technique had been used efficiently. Careful inspection, reinforced by research into experimentally established questionnaire techniques, was sufficient to disclose many glaring faults which can be classified roughly under three headings: (1) errors of construction, (2) errors of administration, (3) errors of analysis and interpretation.

Errors of Construction

Perhaps the basic construction error has been that the questionnaire makers have had only a vague idea of what they would like to find out and have failed to keep in mind the students' point of view and the problems of tabulating and analyzing the data. Failure to remember the students' point of view leads to ambiguously phrased questions and to questions which do not provide a sufficient range of possible answers. Let us say that we are interested in determining whether the local use of visual aids contributes sufficiently to student learning to justify the time and expense devoted to them, and that we phrase an item in this manner:

To what extent do you feel the use of visual aids has helped you in this course? (Check the appropriate response)

Very much_____ Some_____ Very little_____ Not at all_____.

In such an item, the respondent has several chances for confusion concerning what is meant, and, after all responses are tabulated, interpretation of the data would

be difficult. In the first place, a student may react to the novelty of the visual aids themselves and fail to make his judgment in terms of their effective use. In the second place, he has no way of knowing what criterion is implied in the way visual aids "helped" him in the course. Did they give him a better understanding of the subjects, did they enable him to secure better grades, or did they reduce the amount of reading required? On the other hand, if we attempt to secure information on this general subject by approaching it through several more specific questions, we must be careful that the questions we ask are of such a nature that students will be able to make a clear-cut decision. Suppose we decide to use three concise items to gauge different aspects of a question and we make one of them the following:

Have instructors used visual aids effectively?
Yes_____ No_____

Here, a moment's reflection shows at once that there has probably been a considerable range of performance, and since every student can probably think of cases at both extremes, he finds it difficult and unpleasant to be forced into so narrow a choice. Such an item will very often be left blank, and the responses that are made represent so coarse a judgment as to be of little value for interpretation.

The other basic construction error represents the opposite extreme. This is overuse of the so-called "free response" type of item. Here the student is asked a general question and allowed to answer it in any way and with as many words as he desires. While such an item is considerate of the students' point of view and has value under some circumstances, it makes tabulation extremely difficult and interpretation subject to many biases. Whoever analyzes such items must decide on various broad categories into which he must arbitrarily place responses ranging from a word to a small essay. Some responses may fit in only one category, while others seem to fit several. Some responses are vehement on a certain issue, while others mention it very casually. The investigator has to make arbitrary decisions about all such matters if he is to secure any quantitative data. In so doing, he superimposes on the questionnaire item a form which may be heavily loaded with his own biases and which at best gives an extremely inaccurate measure of student opinion.

Errors of Administration

It has been found that short questionnaires generally produce more valuable results than long ones. Yet in most cases where they have been used at service schools, the students have been confronted with a long list of items covering all kinds of subjects. When students are asked to fill these out on their own time, they are inclined to become bored and resentful, thus often invalidating the resulting data.

Failure to appreciate the role of memory is another prevalent fault. Common practice has combined all items into a single questionnaire which is usually administered late in the course. Some of the items have dealt with matters which cannot be remembered easily or which will be subject to the distortions of memory. Examples of such items would be those which ask students to cite instances of good or bad presentations, or to indicate with respect to each subject whether it should be reduced, expanded, or left the same.

A further source of confusion is that students are often inadequately oriented concerning the questionnaire. This is especially true when they are asked to complete the questionnaire at their convenience outside of class. This procedure apparently leads to last minute work by some, to collaboration among some groups, and to misinterpretation in many cases.

Finally, the question of anonymity should be carefully considered. It must be recognized that in the Army situation many students will feel reluctant to com-

ment adversely where personalities are involved. However, if the questionnaires are made anonymous, it becomes impossible to analyze the responses according to rank, age, branch, class standing, etc. Obviously, this is usually a serious limitation.

Errors of Analysis and Interpretation

Too often questions are formulated and data collected with no consideration of the type of analysis that will be possible or appropriate. This often results in a mass of meaningless data for which no rigorous statistical treatment is possible. Further limitations are imposed by the statistical naivete of those charged with the analysis. Unless appropriate tests of statistical significance are applied, conclusions may easily be drawn from mere inspection of tabulated data which are not warranted by the statistical properties of the data. There is likewise a dangerous tendency to infer causal relationships between statistical findings and other factors. Only a person with at least a basic knowledge of statistics is qualified to make, first, an appropriate analysis of the data, and second, recommendations based on what the findings do and do not indicate. Where the data are not handled professionally and objectively, all values of the questionnaire are lost.

Do Questionnaires Have Potential Value?

So many possible pitfalls in the use of questionnaires have been revealed that the reader may be in doubt as to the value of such instruments. While they have been of minimal value to service schools to date, it is probable that with more professional attention they can be made to serve several very useful functions. Among these would be the following:

1. *In evaluating new instructional techniques and units of instruction.* * It may seem obvious to all experts in a field that a new technique is superior but until it has actually been tested in a class situation and the outcome measured by various devices, no authoritative conclusion can be made. One of the measuring devices could well be a questionnaire which would sample student reaction. It is not implied that a pattern of student rejection would be sufficient cause for modifying any "desirable" procedure, but it should certainly be considered in its relationship to other factors.

2. *In evaluating instruction in terms of different types of instructional groups.* Due to emergency conditions, administrative directives, or modifications of educational theory, the size and composition of instructional groups may be changed. Instructional techniques that have been appropriate hitherto may, consequently, be less effective under the new conditions. The students themselves can provide an illuminating insight into this question through the questionnaire method.

3. *In appraising the effectiveness of new instructors and in securing research data on the qualifications of effective instructors from the student point of view.* While many other factors are to be considered in the selection and training of instructors, it is obvious that a more favorable learning situation is created by instructors who do not antagonize their classes. Only the students can provide an authentic opinion on this matter.

4. *In promoting desirable public relations.* All normal human beings like to feel their own opinions are recognized as of some merit. Research in the field of industrial relations has shown that worker efficiency can be materially increased by giving the workers a sense of participation in policy determination through questionnaires, suggestion boxes, etc. There is every reason to expect that much the same results can be achieved through similar methods in military situations. Student morale, learning efficiency, and the gen-

* A unit of instruction at the C&GSC is any subject presented to a class in the form of a lecture, conference, exercise, etc.

eral reputation of the service school can probably be enhanced through such means.

Increasing Questionnaire Values

Improved Construction

As this article has indicated, good questionnaires are not as simply constructed as most people believe. Therefore, they should be constructed under the direction of civilian or military personnel who have had professional training and experience in this field. Furthermore, since the questionnaire results will presumably pertain to all departments and sections, all such groups should have a chance to submit suggestions concerning the type of information they desire to secure.

In general, the construction of each item must: (1) state an issue precisely (2) provide a sufficient range of answers, (3) provide additional space for qualifying remarks in some cases, (4) facilitate scoring and tabulation, (5) avoid overlapping choices.

Improved Administration

The first step might well be to orient students at the beginning of the course concerning their part in the continuous evaluation of instruction. This would immediately secure some of the public relations benefits described above, and it would further enable the students to keep a more accurate record of their impressions.

Class time should be provided for the completion of the questionnaires. This would largely eliminate bias due to hasty work, collaboration, and misinterpretation of directions.

Consideration should also be given to the possibility of measuring student reaction to certain factors at the end of each phase of instruction while memory is still fresh. Anonymity of response might be found to be advantageous for some types of questionnaires.

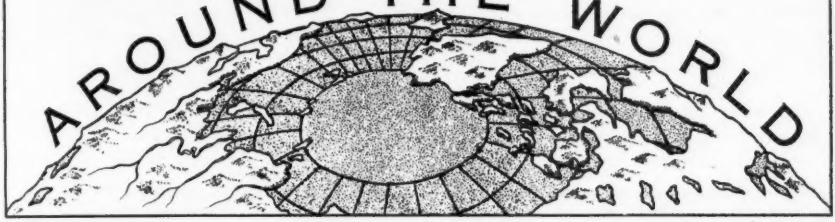
Improved Analysis and Interpretation

More professional analysis and interpretation is the final requisite for more efficient use of questionnaires. This again implies the presence of personnel who have had sufficient statistical training to know what tests are appropriate for the analysis of the particular data at hand. Where significant findings are obtained, commanders should be so informed. It then becomes a command decision to determine whether Army doctrine, military necessity, student opinion, or some other factor is of primary importance in the particular situation.

Conclusion

The foregoing analysis has attempted to show the present shortcomings, the potential values, and suggested means of improving questionnaires in military education. It should be emphasized that even the most expert use of questionnaires should be tempered with good judgment and with other kinds of experimental evidence. However, it seems probable that when used by professionally trained individuals questionnaires can provide some valuable types of information which no other instrument can provide as well. While the underlying philosophy of questionnaires will be regarded by some as inconsistent with military tradition, the experience of industry and similar fields has shown that such instruments can be valuable. In its own interests, a progressive military education should not ignore such experience without giving questionnaires a fairer trial than has hitherto been accorded.

MILITARY NOTES AROUND THE WORLD



UNITED STATES

Weather Radar

A new radar set designed to give weathermen and pilots advance warning of storm areas as far distant as 200 miles from the site of operations has been developed at the Signal Corps Engineering Laboratories, Fort Monmouth, New Jersey. Since the average rate of storm movement is approximately 25 to 30 miles per hour, it will now be possible to anticipate storms as much as 6 to 8 hours before they arrive.

This new equipment is electronically similar to the successful wartime warning radars which told of the approach of enemy aircraft or ships. However, it utilizes what was considered a characteristic fault in the earlier radars, namely, their tendency to pick up signals from nearby rainstorms, thereby masking indications from possible enemy targets on the far side of such rainstorms. In this new equipment, the design has been arranged to accentuate the storm signals and to permit their detection at relatively great distances. The clouds themselves do not necessarily appear to the eye as they look on the radar; but a section of a storm having liquid water always will produce some kind of radar indication.

The apparatus consists of a highpower radar transmitter, a large 8-foot parabolic antenna mounted on a 100-foot tower, and a sensitive radar receiver. The signals received from any storm area within range of the radar can be displayed on several types of oscilloscopes which contain cathode ray tubes similar in appearance to home television screens. The signals can be used to "paint," electronically, a picture similar to a relief map of the area or to give a vertical cross-section of the storm. In both cases, the radar set introduces its own "scale of miles" on the map so that the operator can quickly and simply estimate the distance of the storm from his station.

This equipment has been undergoing operational tests by engineers of the Signal Corps Engineering Laboratories. To date, the tests have shown promise of greatly increasing the forecasting range of the weather observer, improving his accuracy, and permitting short-range local predictions of relatively high precision. As a research tool, the new radar will give the professional meteorologist the means for exploring storms, observing their life cycles, and thus leading to better understanding of the physics of storm development.—Signal Corps Center.

Cold-Weather Shelter

A pneumatic quonset hut that is made of cotton fabric and can be blown up with a hand pump has been developed jointly by the Air Matériel Command's Aero Medical Laboratory and the United States Rubber Company.

The structure has no internal braces and can be supported by as little as 1½ pounds of air pressure. This pneumatic hut is expected to be ideal for stranded airmen in the Arctic.

Made of inch-thick, two-layer cotton fabric with 40 to 60 interlocking supporting threads per square inch laced between, it is coated with a low temperature Neoprene compound that will withstand extreme cold. The dead air space between the two layers of cotton provides the best inherent insulation known today. In addition, the hut is designed to stand up to 100-mile-an-hour gales.

The hut is also draft proof, snow proof, water proof, compact, and easy to transport. There is no fear that the pneumatic hut will buckle under the weight of arctic ice and snow. Its rigid air fabric can be fabricated to withstand up to 32 pounds of pressure and, inflated to that extent, could support about 500 pounds of weight.

The quonset is 4 feet high, 7 feet wide, and 9 feet long. It will comfortably house four men. It can be erected with high-volume, low-pressure hand pumps in about 3 minutes. Through a series of interlocking connections, the hut and its floor (comprising a total of five sections held together by a low temperature Neoprene cement) can be inflated simultaneously. However, if one section should be ruptured, the others would remain intact.—Air Matériel Command.

Something new in arctic shelters is this quonset hut which unfolds from a compact bundle and can be blown up with simple hand pumps in 3 minutes.—Air Matériel Command photo.

Ordnance Developments

An example of heavy equipment being developed at the US Army's Aberdeen Proving Grounds in Maryland is the T-8 tank transport, above, designed to carry medium and heavy tanks. The transport is in two sections with a driver in each. It operates on the same principle as the hook and ladder fire truck. Below, the sections are separated to allow the tank to run off or to be pulled up onto the carrier.—Department of Defense photos.

Fire-Resistant Suit

A suit designed to keep aircraft crash firemen at a cool 130 degrees of body temperature while working in a flaming inferno of gasoline and oil that registers 2,000 degrees has been put through a series of successful tests by the United States Air Force Engineering Division at Wright-Patterson Air Force Base, Dayton, Ohio.

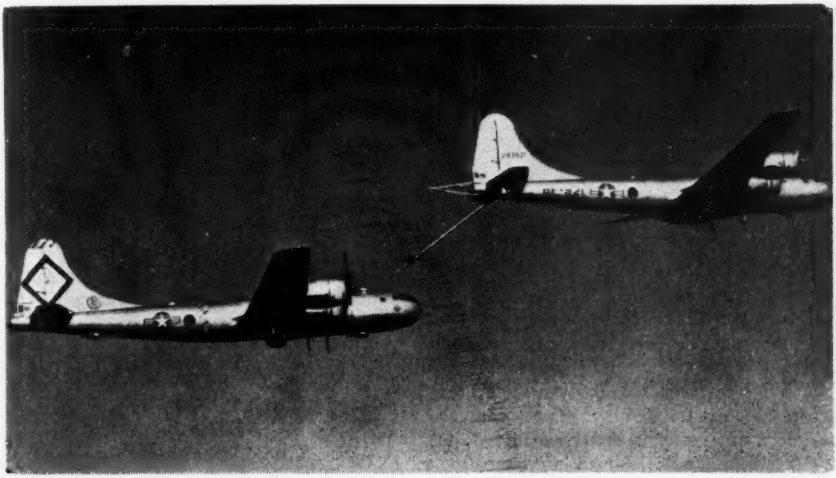
The suit, only one of its kind so far developed, is made up of 18 layers of glass fiber, glass fiber batt, glass fiber net, Neoprene coated glass fiber, honeycombed cotton cloth, silver foil, aluminum foil, and nylon. The materials are arranged so as to provide the best possible protection yet devised against both the conductive and radiative type of heat experienced in aircraft crash fires.

In all, the suit is only about one-half inch thick, and gives the lowest possible bulk and weight consistent with its insulating function. The material is able to withstand abrupt and extensive changes in temperature without loss of physical properties and contains nothing which would be deteriorated by water, oil, common solvents, fuels, lubricants, or fire-fighting agents.

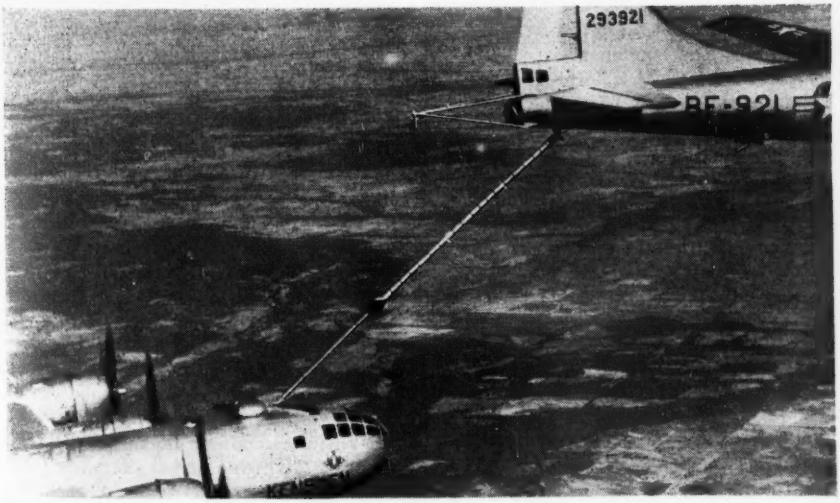
The new apparel consists of a one-piece coverall, a hood, mitten-type gauntlets, and asbestos soled boots of the 18-layer material. It has a total weight of approximately 29 pounds. The mittens are of slightly lighter-weight material than the rest of the suit, both because of the greater heat tolerance of hands and because of the need for hand dexterity. The head and body are completely enclosed to protect the respiratory system against external heat, flame, and hot, noxious gases. —Air Matériel Command.

Above, left, the latest type protective clothing for use in actual flames; above, right, a volunteer engulfed in flames which reached a temperature of 2,400° F.—Air Matériel Command.

Mid-Air Refueling



The Boeing Airplane Company has developed a new "flying boom," air-to-air refueling technique for the US Air Force in which fuel is transferred under pressure from a tanker to a bomber by means of a telescoping pipe extending from the tanker's tail. The picture above shows two planes hooked together for refueling. The closeup below shows the airfoil on the boom which allows it to be actually "flown" into position for the contact with the plane being refueled.—Department of Defense photos.



Wire-Making Machines

Safeguards have been taken against a repetition of a serious wartime bottleneck in the communications industry through Army storage of four times as many field wire stranding and twinning machines as existed before 1941.

About 400 machines have been secured from the War Assets Administration under the Joint Army-Navy Machine Tool Program of the Munitions Board and have been stored in Signal Corps depots. At their 1942 purchase price, they have an aggregate value of $1,600,000. They will be furnished manufacturers in event of an emergency.

It took more than a thousand such machines to meet World War II military requirements for field wire, an essential element of combat communications.

Based on World War II experience, the availability of wire stranding and twinning machines will enable manufacturers to save months in reaching mass production schedules in the event of another emergency.—Office, Chief Signal Officer.

New Electronics Device

Possible revolutionary changes in Army communications equipment were foreseen by the Chief Signal Officer, following announcement by Bell Laboratories of the development of a small electronics device called a transistor.

The Army has ordered tests of the transistor which will do most of the things that a vacuum tube will do and some that vacuum tubes do not do.

The transistor is important to the Army because, having no filament, it requires no heating current to do its job of amplifying voltages. In portable communications equipment, such as the walkie-talkie and the handi-talkie, a large part of the weight and bulk consists of batteries used to heat tube filaments. The transistor could take a great load off the ground soldier's back.—Department of the Army.

Atomic Planes

Glenn L. Martin, plane manufacturer of Baltimore, wrote recently that aircraft some day will use atomic power, and fighter pilots would be largely a thing of the past.

He said big planes, powered by atomic energy, could be expected "in the foreseeable future."

"It appears certain that military offensives and defensive tactics will be based on the known and still to be developed versatility of the pilotless guided missile.—*The New York Times.*

Underwater Jet

Problem: how to make a jet engine work under water. Solution: make it use a fuel that burns in water instead of in air.

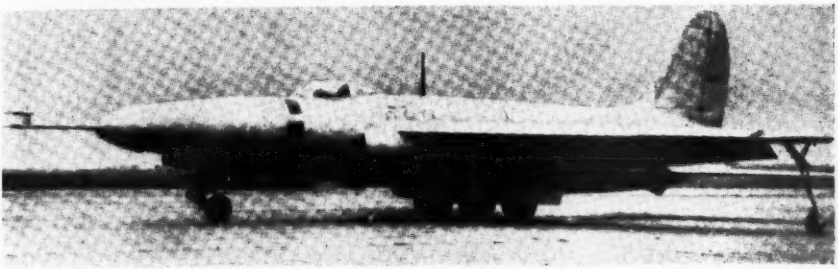
Such an engine has been developed for the US Navy, which hopes to use it in torpedoes or in anti-submarine devices.

The waterborne jet works on much the same principle as the airborne ram-jet. It consists of a roughly cylindrical chamber with openings at both ends. As the engine moves forward, water comes in the front opening and is mixed with a "water reactive propellant." A "surface tension depressant" (wetting agent) is injected into the water, too, presumably to help the fuel mix with the water stream or to help bubbles form.

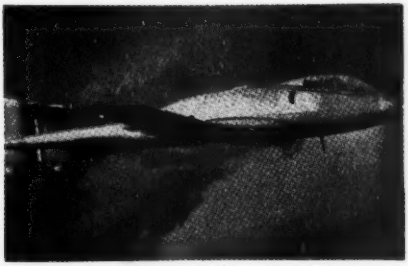
There are plenty of propellants that burn when brought in contact with water, such as metallic potassium, sodium, white phosphorus, or various metallic hydrides. Some of these can be used in convenient liquid form. When such fuels hit water, they decompose it violently by uniting with its oxygen, giving off heat and a large volume of hydrogen gas. The combustion chamber is shaped so as to make the expanding water-and-gas mixture shoot out the rear opening as a high-speed jet. The reaction from this drives the engine, and the torpedo, forward.—News report.

FRANCE

New Jet Aircraft



Above, the *Sud-Ouest M2* is an experimental flying jet model of a large French jet bomber. It is powered by a Rolls-Royce jet, and like some US jets, has tandem main wheels and outrigger gear on the wings. Below, left, the *Sud-Ouest Triton*, a two-place jet trainer; below, right, the *Sud-Ouest Norval*, a shipboard pusher fighter powered by an Arsenal-built 2,250-hp Jumo; maximum speed is 455 mph.—*Flying*.



PAKISTAN

Destroyers Transferred

The former British destroyers *Onslow* and *Offa* have been sold to the Royal Pakistan Navy.

The *Onslow* achieved fame during the escorting of a Russian-bound convoy in December 1942. Sighting an enemy force, including the German cruiser *Admiral Hipper*, the escorts led by *Onslow* went into attack and closed with the enemy. The ship was hit and set on fire, and her captain was among those seriously wounded, but the vigorous action sustained by the destroyers succeeded in warding off the threatened attack on the convoy.

Offa, a vessel of the same class as *Onslow* also saw service in protection of convoys bound for Russia and it has been claimed that she fired the first shot in the liberation of Europe from the sea. She opened the bombardment of Catania an hour before troops landed on the beaches of Sicily. These two former British warships were built under wartime construction programs and completed in 1941. They are the first warships which the Pakistan government has acquired from Great Britain and, with the tradition of service which attached to them, represent to Pakistan an acquisition having value other than of a purely material character.—*The Fleet*, Great Britain.

GREAT BRITAIN

Paratechnicon

A new heavy equipment container, known as the paratechnicon, was demonstrated for the first time recently. The metal container, designed on aerodynamic principles, fits onto the belly of a transport aircraft and has a payload of 6,000 pounds. It is brought to earth by eight 42-foot parachutes.

British heavy equipment container.

The paratechnicon allows the entire payload of a transport aircraft to be dropped without dispersion. As the device glides to earth, three cylindrical shock-absorbers are revealed by the automatic opening of hinged flaps. When the paratechnicon hits the ground, the air in the pneumatic shock-absorbers bursts through small ports and the absorbers gently deflate. At the same time, the eight parachutes are released.

A normal load for one of the paratechnicons would be a jeep towing a gun.—*The Sphere* and *The Illustrated London News.*

Atom Defense

British defense experts are learning how to protect the country's 50,000,000 inhabitants from atomic attack.

In one of the government's two training centers, groups of 50 men and women pass steadily through 3½ week courses, returning home to hand their knowledge to local civilian defense units.

In especially built "atomic villages" made of rubble and masonry, they learn how to handle radioactivity detectors and how to deal with blast and fire. This training school is the first stage in the development of the country's fledgling civil defense organization, which is ready to go into action at any time.

How effective this organization would be is problematical, but the fact remains that, in sharp contrast to the United States, it exists. Since the end of the War, Britain has been quietly preparing a plan to organize civilians into a trained, disciplined group.

Already in Britain there exists a civil defense headquarters in the Home Office with a joint planning staff, with far-reaching powers approved by Parliament, with training schools, and with a clear chain of command reaching down to the smallest local authority in the land.

The British government does not believe war is imminent or likely. Purposely, it has given little publicity to its civil defense preparations, but now, despite economic difficulties and slashed estimates, it is moving forward.

After 3 years of analysis of the German and Japanese civil defense, plus masses of other data, Home Office experts received from Parliament powers to put civil defense on a permanent basis. Thus was born the Civil Defense Act (1948), the chief feature of which was delegation of civil defense powers to the local governments.—*The New York Times.*

Realistic Maneuvers

Troop units from five nations, Great Britain, United States, France, Belgium, and Norway, took part in training maneuvers in Western Germany recently. The large-scale exercises were held in the region around Paderborn and Sennelager, where once German *Panzer* and *SS* divisions were trained.

The exercise originally called for the employment of joint forces, air and ground, but heavy mist and clouds restricted air activity to a great extent. Consequently, tank formations occupied the main attention of observers. Cooperation between infantry and armored units was watched closely. The exercise included a night withdrawal and counterattacks.

New weapons shown included Britain's latest, biggest, and most expensive tank, the *Centurion*, which weighs 48 tons and carries a 20-pounder gun.

Among the many distinguished visitors who observed the maneuvers were the British Minister of War and also the Director of Military Training, War Office.—*The Sphere*, London.

Above, left, tracked vehicles going into position during the combined maneuvers in Germany; above, right, tanks advancing through infantry positions concealed by a smoke screen; below, left, a Bren gunner and two riflemen assaulting by fire; below, right, a new British 48-ton *Centurion* tank in an advance across country.

USSR

Long-Range Rocket

A Berlin dispatch reported recently that German scientists were producing for Russia trans-ocean rockets they designed for Hitler just before World War II ended. It quoted Soviet zone informants, who have access to offices of the Soviet-backed East German police, as saying the mammoth underground munitions plant at Peenemuende on the Baltic coast was turning out rockets at full speed.

The new rocket, said the German informants, was dubbed "fire lily" by the Nazis, who never had a chance to use it.

The name comes from the way the rocket blossoms into 8 to 10 separate aerial bombs when it arrives over the target, scattering destruction over a 3-square-mile area, informants said. Its range and accuracy are enough, the report said, to hit a target 5,000 miles away.

Production of "fire lilies" is carried out in the vast underground caverns which the Nazis fitted out for rocket and torpedo plants and testing grounds.

The informants said the entire population of Peenemuende was evacuated when the Russians began rebuilding the rocket plant.—News report.

Prisoners of War

A *Tass* announcement from Moscow has stated that all remaining Japanese prisoners of war in Russian hands—about 95,000—were repatriated between May and November 1949, thus completing the repatriation of Japanese prisoners of war with the exception of certain persons retained for investigation on charges of war crimes. The statement added that of the total number of 594,000 Japanese officers and men taken prisoner by the Soviet Army, 70,880 were released in the area of military action in 1945, and 418,166 had been repatriated between that year and 1 May 1949.—*Journal of the Royal United Service Institution.*

Armament Program

The Soviet *T-34* tank can be fitted with a heavy plow for removing obstacles. When thus equipped, the *T-34* resembles an American bulldozer. The Russians also have a caterpillar-type tractor which can be equipped with an excavating device for digging trenches.

Cables are being used to transport personnel across streams. If pneumatic rafts or boats are not available, or if it is impossible to use them, riflemen are provided with floats and small paddles. The buoyancy of these floats is sufficient to hold the upper part of a soldier's body above the level of the water.

The Soviets have transformed their *SIS 5* 3-ton truck into a half-track vehicle, which resembles the German *Maueltier*, by replacing the rear axle and wheel drive with a caterpillar tread. Due to this change, the vehicle is able to tow a 122-mm howitzer—total travelling weight 6,615 pounds—over open ground.

The Soviet Army is now using the following types of motor vehicles, all of which have come into use since 1946:

GAS 67, the Russian "jeep."

GAS 51, a four-wheeled truck with a six-cylinder motor, having a load capacity of 5,982 pounds and total weight of 11,488 pounds.

GAS 63, a four-wheeled truck with protective grating for the radiator, similar to American vehicles. It has a six-cylinder motor and a load capacity of 7,231 pounds with a total weight of 11,641 pounds.

SIS 150, a four-wheeled truck with a six-cylinder motor and a load capacity of 8,595 pounds, with a total weight of 16,305 pounds.

JAS 200, a four-wheeled truck with a four-cylinder Diesel motor and a load capacity of 13,604 pounds.

SIS 253, a four-wheeled truck.—*Allgemeine Schweizerische Militarzeitschrift* (Switzerland).

Loss of the Peace

Translated and digested by the MILITARY REVIEW from an article by André Gerteiser in "Le Monde Français" (France) May 1949.

WAR is essentially a political act. It cannot be conducted solely from the military point of view.

In the conduct of war, the political direction, which rests with the political chiefs, and the military direction, which is the province of the military chiefs, cannot be separated completely.

Furthermore, it is erroneous to believe that decisions arrived at by political leaders can be carried out by military chiefs who do not possess a profound political instinct.

The skill of the commander in chief cannot be limited exclusively to winning the war.

If a war is lost, no question as to the political skill of the commander is raised. In desperate cases like that of England in June 1940, such functions of the commander disappear for the moment in the violence of battle.

But when a war is nearly over and victory is near, the ambition of the military chief should tend not only toward obtaining this victory at the least cost, but also toward terminating the war in such a way that the military disposition at the end of the conflict will be what his country might desire politically.

The commander in chief ought to direct his armies in such a way that their final disposition will make it possible for his country to conclude an advantageous peace and obtain compensation for the sacrifices made.

If a military chief does not make it possible for his country to win the peace, he has not fully accomplished his task. Victory is then reduced to a military act devoid of political sense, to a simple technical experiment in destruction.

The United States paid the cost of the rearmament of all the United Nations during World War II, even of those whose policies today are opposed to its own.

American chiefs, military and civilian, directed the war in Western Europe and in the Far East, and they won the war.

But it cannot be said that the United States today is in a good military situation, one that would permit it, in complete tranquility, to discuss terms of peace. The final disposition of the American armies did not help American diplomacy obtain a good peace. Not only was peace not won, but it has almost been lost. Grave errors must have been committed. What were they?

Italy, November 1943—May 1944

In June 1944, the finest opportunity

was lost in Italy. The Allied High Command was occupied there with the execution of the general directives for the conduct of the war issued by the Teheran Conference in November 1943.

These decisions were the result of consultation of the military and political chiefs. Naturally, they had been made on the basis of the strategic and political situation as of November 1943.

At that time, the Russian line extended from Leningrad, which was still in a state of siege, to a point east of the Crimea. The Russians were preparing a winter campaign on their northern and southern fronts in order to improve their position before the general attack of all the Allied armies on all the fronts, as planned for the beginning of summer in 1944.

The Russians wanted the Western Allies to relieve them during this period by tying down German forces. They did not wish to unleash their summer offensive of 1944 except in conjunction with an offensive on the Western Front, after the latter had been started.

At this time, the Western Allies had only one active front in Europe, the Italian front. It was necessary, therefore, to maintain it if this aid which Russia was demanding was to be provided.

However, the Allied High Command did not like this front. Its operations there had not been very successful. The Salerno landings had nearly been disastrous. Mountain warfare at first was almost unknown to the American and English troops. Losses had been heavy. The advance up the peninsula in the face of fairly weak German resistance had been slow.

The Italian peninsula is very mountainous. The Apennines, after serving as the backbone of the peninsula, separate the peninsula north of Tuscany from the plains of the Po. Farther on, the Alps surround this plain on all sides. The crossing of these Tuscany Apennines presented a problem that the Allied command and the staffs considered very difficult.

As for reaching and crossing the Alps, this was not even considered because of the difficult nature of such mountain operations.

The idea became fixed, therefore, in the minds of the Allied High Command that Italy was impassable and that nothing decisive could be done there. Since Italy could not be the gateway to Central Europe, a difficult and costly campaign that could never pay should not be carried out.

From this moment, the Russians began to draw up their peace map. They had already prevented the Anglo-Saxon forces from passing through the Balkans. They had grounds for fearing an untimely arrival of the armies from Italy in the Eastern Alps.

Naturally, the Russians were not slow in manifesting their approval of the plan to keep the Italian theater secondary.

It was decided to keep the Italian front active, there being no other alternative. The capture of Rome was necessary as a political maneuver.

Immediately after the taking of this city, the principal invasion front opposite the British Isles was to be opened, followed by the general Russian attack.

Then, the Italian front would become secondary to the main battle.

The large Allied forces in Italy would be transported, along with the other Mediterranean forces, to Southern France, leaving reduced forces in Italy only strong enough to hold the terrain.

This strategic idea of November 1943 cannot be said to have been an inspiration of genius. It did bear the marks of the disgust which the Allied High Command felt toward Italy. But a military plan of operations thus conceived, 6 months in advance, could be no more than a collection of probabilities, to be revised if the general situation changed.

Situation in Italy, June 1944

In June 1944, the situation in Italy was not the same as in November 1943. It was completely reversed. Thanks to the French mountain forces and to the new aptitude for this special type of warfare which the American troops had acquired after intensive training, the attack of May 1944 had succeeded. Kesselring's German armies were thrown back in confusion beyond Rome after violent fighting.

In the face of this, the Allied High Command was forced to make a new decision. War is not waged in accordance with a plan firmly fixed in advance. Strategy that remains unaltered is dead strategy.

The generals in command in Italy, especially General Alexander and General Juin, strongly urged the Allied High Command to authorize the pursuit after the fall of Rome.

General Sir Maitland Wilson, commander in chief of the Mediterranean area, makes no effort in his report to hide how desirable such a solution in the Mediterranean area would have seemed to him.

Victory rarely affords a chief so favorable an opportunity for marking the battle with his genius as did that in Italy during June and July 1944.

Military Situation

The Germans were completely at the end of their strength. At the beginning of June, General Mackensen's German *Fourteenth Army* had lost 25,000 prisoners. Its losses in killed and wounded were considerable. It had been forced to abandon the greater part of its matériel.

The German *Tenth Army*, which was defending the Adriatic region, was broken in morale, under strength, and retreating without offering much resistance.

On 1 July, Marshal Kesselring's front extended from west to east, from the Tyrrhenean to the Adriatic Sea by way of Lake Trasimene. Only the remains of 11 German divisions—5 infantry, 1 SS, 3 motorized, 1 paratroop, and 1 armored—remained on the front of the American Fifth Army, 100 kilometers wide. On the 200-kilometer front of the British Eighth Army, the remains of 11 other divisions—7 infantry, 2 mountain, 1 motorized, and 1 paratroop—were located.

These divisions, which had been retreating since May and suffering defeat after defeat, had regrouped all the troops they were still able to assemble into combat groups *(Kampfgruppen)* whose strength varied between 500 and 2,000 men.

Losses were so great that 10 divisions only were able to organize 17 *Kampfgruppen*, or less than 2 per division. The average strength of these divisions was, therefore, from 800 to 1,700 men. These figures show what the condition of their infantry and the reduction of their artillery must have been.

The 22 German divisions on the entire front comprised a total of 67 *Kampfgruppen*. The total strength of their fighting forces was about 50,000 men at most, dispersed over a front 300 kilometers wide.

Marshal Kesselring had only five or six reserve divisions back of the front, all of which had been drawn back because of their nearly complete destruction.

Kesselring was so short of reinforcements that he had been forced to raise a division of infantry from his own service forces for protecting Genoa from a probable landing, and he had to use a mountain division at Istria to guard the southern flank of his main route of retreat.

The Allied Army Group under General Alexander had the American Fifth Army under General Clark, of which the French Expeditionary Corps under General Juin formed a part, and the British Eighth Army.

This group could have been immediately reinforced by the American Seventh Army under General Patch, which had been

formed in Sicily; and by 3 French divisions (2 armored), stationed in North Africa, and the French Expeditionary Corps, which were to form the French First Army.

These four armies would have, therefore, comprised a total of 35 complete and well-trained divisions—including the Brazilian Division—or 350,000 troops provided with excellent equipment and abundant replacements.

Ten or more of these divisions were trained and equipped for mountain warfare. Therefore, mountains would not have been an obstacle for Alexander's Army Group, thus reinforced, as was shown by the victory of 11 May on the Garigliano.

The fleet which transported the landing forces to Southern France and the one which later carried their supplies would also have been able to transport and supply the reinforcing elements of Alexander's Army Group. The theater of operations was the same and the needs identical. With this mass of four armies, General Alexander was certain of being able to complete the pursuit and the destruction of Kesselring's Army, of liberating Northern Italy, of crossing the Po, and of reaching Brenner Pass in the Alps.

The Germans could not have reestablished themselves before reaching the line Brenner-Trieste, and they even had little hope of doing that.

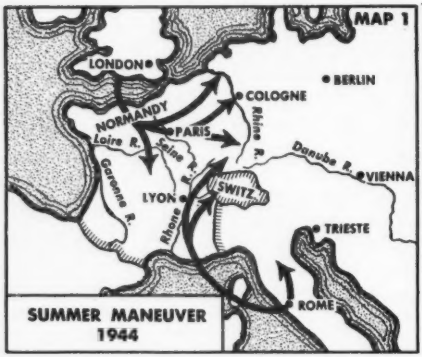
The rapid occupation of the Brenner-Trieste line would, quite obviously, have been of greater importance in the over-all battle than the depressing halt in Tuscany that was forced on the Allied forces in order that the Allied High Command might stage a completely new operation.

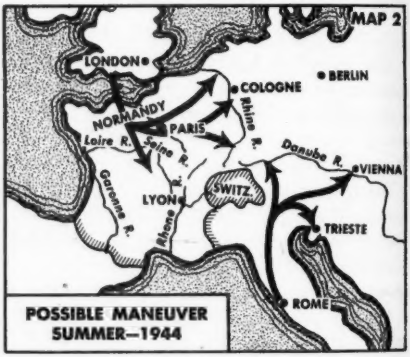
What would Alexander's four armies have done after arriving at the Alps? Would they have been able to enter Austria or to go into Jugoslavia? We have no idea, but we do know that they would have forced the Germans to concentrate considerable forces against them which neither Eisenhower in the West nor Stalin in the East would have had to face.

Lastly, when the German positions cracked, these four armies could have entered Austria and could have reached Vienna long before the Russians.

The Russians could not have complained about not having received enough aid before their decisive battle.

The Allied High Command, in spite of the advice of the Inter-Allied High Command of the Mediterranean Theater and the British Imperial General Staff, said toward the end of June that its decision was final and that the invasion of Southern France would not be changed.





This is the first instance in history that an army which was about to achieve victory abandoned the pursuit of an enemy in full retreat and withdrew from the field of battle for the purpose of sluggishly putting into operation elsewhere a plan no longer appropriate.

It is rare to find strategic incapacity so clearly defined. What would have happened if, instead of victory, it had been a defeat—that had forced a change of plans?

It appears that the Allied High Command committed the mistake of considering only the plan they wished to apply, and of ignoring all alternate plans they might need later.

In the Mediterranean, the Allied forces could have been employed in three ways: a landing in Southern France; pursuit in Italy; or a landing in the Balkans.

The last two possibilities should have been thoroughly studied. If it was probable that the Balkan plan was less urgent, it is almost contrary to all moral law that the Allied High Command did not plan to achieve a complete victory on the front where it was already fighting.

It is regrettable that the staff passively applied a plan which had previously been outlined. This would have been commendable on the part of the subaltern, but it was not what one had a right to expect of an army chief.

It is an unjust underestimation of a combined staff to suppose that it could not rapidly have staged an operation that was technically so simple.

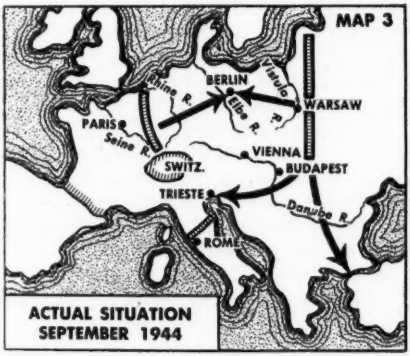
However that may be, the forces in Italy which were drawn back from the front, with their supporting forces, remained in Italy for 2 months at a decisive period of the war, and took part in later fighting only after the battle of France had already been won.

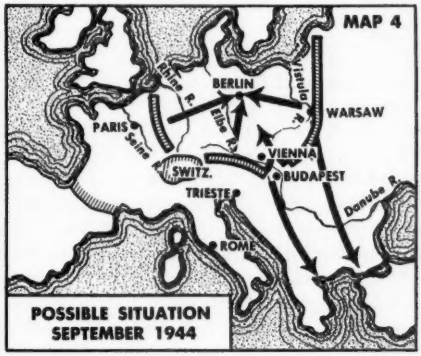
During this period, the Germans were able to maneuver and to move their forces to either of the fronts.

On the Italian front, Kesselring, unable to understand his respite, completed his demolitions, reestablished his positions, and reconstituted his command and morale.

Were the strategic results which were to be expected from the landings in Southern France greater than those which would have been obtained by a drive on Austria? Quite the contrary. Map 1 shows the operation that was conducted. Map 2 shows the operation that could have been conducted.

As the result of the first operation, the Allies could expect only to reinforce indirectly Eisenhower's already victorious





army. On the other hand, the enemy was freed of all other preoccupations on the Western Front.

Under these circumstances, the final operation could be only a frontal and costly battle. It permitted the Germans to prepare counterattacks with their general reserves which, as a matter of fact, were carried out later in the Ardennes.

On the contrary, the second operation, pushing toward the Alps, would have broken up the German strategic position. It would have forced the Germans to effect a regroupment which could have been done only in their rear areas, using the reserves which later opposed Eisenhower and Stalin.

It is not necessary for one to be an expert to see that the first operation reduced the amount of movement necessary and permitted the Germans to concentrate on whatever front they might desire to hold. It relieved them of all preoccupation with the Alps, without even expediting the evacuation of France, which the advance of Eisenhower's armies provoked without any great German losses.

Aside from the Normandy front, only reduced and isolated forces remained in France. The Army Group under General Devers, which landed in Southern France on 15 August, encountered no serious resistance, except from isolated strongpoints, and in the Vosges Mountains.

As for a drive of the Army Groups under Generals Clark and Devers in the direction of Vienna, which was not attempted, it could have brought about the collapse of the Hungarian front ahead of the Russians. Also, it could have broken the Rhine front ahead of the Americans, either from fear of envelopment or from the necessary withdrawal from those fronts of forces to be used in attempting to prevent the breakthrough from Italy.

In spite of first appearances, as soon as the Allied forces had arrived at the Alps, there would have been but one Allied front and not two—a single front whose two branches would have been united, not separated, by Switzerland.

Generals Alexander, Juin, and others, called attention to all these arguments in support of their plan. But the Allied High Command did not listen.

Political Error

Yet, the political error committed by the High Command was still more serious than the military error. This political mistake now weighs on the destiny of Europe and the future of America.

How was it that the Allied High Command and the political authorities did not realize how different the final disposition of the victorious armies, on which the treaties of peace depended, would have been if the simplest of the military solutions had been adopted?

By August 1944, Italy would have been in the hands of the Allies, and that would have prevented Mussolini's reappearance. Italy would have entered the ranks of the United Nations without the tragedies of the various liberations.

Anglo-American troops would have extended help to Jugoslavia by bringing them material and military support. The Russians, on the other hand, merely made a symbolical gesture at the eastern frontier of this country in September.

The difficult political situation in Jugoslavia would not have developed as it has since that time, in open hostility toward the Western Allies. Trieste would not have been a question, endangering peace.

Anyone could have understood that the conditions of peace depended on the respective lines reached by the two groups, or their allies, in the Far East and in Europe, and the manner in which they reached them.

No one could have failed to notice the selfish methods which the USSR pursued in its own war aims. Russia had been the ally of Germany for 1 year, and almost up

to the very last minute it maintained its neutrality with Japan.

Before, during, and after the various armistices, Russia's military forces were always found where they were of most use in supporting her politically. It would be foolish to criticize Russia for this, but it would also be stupid not to note it.

The Allied High Command did not understand, or it did not call attention to, the different moral atmosphere and balance of power that would have resulted if the iron curtain had not been drawn across Europe.

On the contrary, the liaison which could have been established on the Danube by the simultaneous arrival of the Americans at Vienna and of the Russians at Budapest would have changed the entire political aspect of the final reduction of Germany.

Maps 3 and 4 illustrate this concept. In Map 3, the clash of the Allies and the Germans appears as it actually took place. Map 4 shows how the Balkans could have become a zone of contact and of joint action instead of an area dominated by only one of the Allied Powers.

Is it not possible that the peace of Europe was lost, for years to come, in those summer months of 1944?

The Future of Germany

Digested by the MILITARY REVIEW from an article by S. G. Maurice in "The Army Quarterly" (Great Britain) July 1949.

Germany Today

THE six-power conference in June 1948, between the United Kingdom, the United States, France, Belgium, the Netherlands, and Luxemburg on the future of German political and economic affairs decided on the establishment of a Military Security Board, which would insure that Germany remains disarmed and demilitarized. It also provided for an International Authority for the Control of the Ruhr. The delegates of the six Western Powers have now completed a detailed draft agreement for the Ruhr Authority.

This agreement—aimed at insuring that the resources of the Ruhr can never be used again by Germany against her neighbors—has been greeted with marked satisfaction in France. France has never failed to make it clear that she still fears a resurgence of Germany. In England and America, the French may appear hypersensitive over the German question. But France remembers 1870, 1914, and 1940; she remembers, too, the re-occupation of the Rhineland in 1936. Surely, France is right in being cautious. It is too early to be sure that a reconstituted and independent German state will fulfill its proper role in the comity of peace-loving nations. The Germans must first prove beyond doubt that they have left their record of aggression behind them.

The occupation of Germany after World War I, intended to prevent her from waging war in the future, was cleverly turned by her to her own purposes. Her deliberate policy of dividing the Allies and driving her propaganda deep into the heart of the Allied countries was extremely successful. France had become anti-British within a short time of the Armistice, and the failure of the two great powers of Western Eurbpe to coordinate their foreign policy in the period between the two wars certainly hastened the second and probably alone made it possible. By shamming dead, economically and financially, Germany exploited the situation in which she found herself so as to arouse unjustified sympathy. This caused Great Britain trade difficulties which Germany calculated

would be blamed on the Peace Treaty and on the Allies. During the years of occupation, German propaganda ran riot. Few steps were taken to counter it, and the High Commission itself was its tool.

Occupation Today and Tomorrow

The end of World War II saw the Allies determined that the mistakes of 1918 would not be repeated. In 1945, they understood that it was essential that Germany's defeat be complete and final, and that she be prevented, by education or by force, or a combination of the two, from inflicting another war upon the world.

It was clear that the first prerequisite was the occupation of the whole of Germany and the disbandment of the German Army and the para-military organizations. The initial mistake after World War I had been the failure to occupy the whole country, including Berlin. Failure wholly to disintegrate the German General Staff was the second. When, however, in May, 1945, the Allies overran Germany, the Third Reich collapsed so completely that many of the operations which had been the subject of detailed planning had to be abandoned. To such an extent had the German Army, together with its staff, already disintegrated that there seemed little to be feared from it. The Allied policy since the occupation had been to disperse to civil employment what remained of the armed forces, individuals being carefully "screened" and those with marked "Nazi" leanings being kept under preventive detention. The imprisonment—and in the case of some, the execution—of German officers has been the object of considerable criticism in this country. The practice is certainly unprecedented—if one excepts such individual cases as that of Napoleon—in modern civilizations, and the execution of defeated enemies is not easy to defend. Their preventive detention is, however, excusable when one remembers the results of allowing the General Staff liberty in 1918, when it was shown clearly enough that to lose a war was to Germany merely to lose one round in an eternal struggle.

Broken though Germany may at present be, her permanent subjection can only be secured by a lengthy occupation. After World War I, the last occupying troops were withdrawn from German soil after only 11 years. The present occupation must be far longer, just as it is far more complete. Completely permanent occupation and control is obviously not desirable if it can be avoided. Allied policy should be to control Germany until such time as all traces of the *Herrenvolk* doctrine and the spirit of aggression have been utterly destroyed. She must be occupied until such time as she can be made a decent, peace-loving state.

German Reeducation

Demilitarization by the dispersal of the remnants of the armed forces, destruction of war material and demolition of fortifications, together with control of German industry so as to eliminate the war potential, have been primary tasks of the Control Commission. But the problem of making Germany a useful member of European society resolves itself very largely into the question of educating the Germans, and education is one of the biggest difficulties which the control authorities have had to face.

The education of the Prussian military caste was extremely narrow and entirely military, aimed only at teaching the pupil to glorify Germany and the success of German arms, and to prepare himself for war. The National Socialist regime went a step further than that, in falsifying the textbooks used in German schools so as to delete from them anything which might be harmful to the Nazi ideas, and to promote the idea of Germany as the *Herrenvolk*, while showing the non-German world in the worst possible light.

The effectiveness of this teaching in Germany was exemplified by the demeanor of the Hitler Youth. From the age of 10 to 14 years, all German boys belonged to the German Youth. From 14 to 17 years, or until the time when they were called up for military service if this happened before they reached the age of 17, they belonged to the Hitler Youth proper. Parallel organizations existed for girls. During these formative years, the youth of Germany was taught nothing which did not extol the Nazi creed. It is not surprising that the result was to produce utterly evil, callous, and brutal children, ready, if need be, unhesitatingly to betray their own parents to the *Gestapo* if they should utter a chance word in criticism of the regime.

The problem of dealing with such people appears almost insuperable, especially as the teaching profession in Germany upheld Nazism, yet it has been tackled optimistically. Suitable teachers have been found, and completely new textbooks, setting out the truth, have been introduced. As yet, it is perhaps too early to speak of results. A considerable measure of success may be looked for in reforming the younger children, but it will be very difficult to insure that the older ones, already steeped for years in the Nazi doctrine, have been entirely redeemed. To deal adequately with the young Germans who had already left school when the war ended is an even more formidable problem.

With relations between the Western Powers and Russia as they are, the future of Germany lies in a haze of uncertainty. At the moment, her plight is unhappy enough, and dissensions among the Allies do not help matters. Germany can never be a coordinated whole so long as an "iron curtain" hangs between the western zones and the east. In such circumstances, there is already a tendency in this country to pity "the poor Germans." Though justice should always be tempered with mercy, it is rash to regard the Germans too leniently so comparatively soon after their defeat.

It is not suggested that Germany has begun to plan vengeance by another war as she did after 1918. Her defeat has been so overwhelming that any such planning would as yet be virtually impossible. But that is not to say that the Germans will not, if they get the chance, employ all those subtle devices, which they used after World War I, to undermine the Allies' determination to maintain the occupation. They will not promise, as the National Socialists constantly did, to refrain from any form of aggression in the future, saying that they have no designs on any country, while all the time, if they are given the opportunity, preparing for another war. It is necessary to be wary of their wiles, of being drawn into sympathy with them. The Prussian military caste may be a small body, and now a greatly depleted one, and the National Socialist Party may have numbered among its active supporters only a minority of the German people. There still are very few Germans who are not imbued in some degree with the spirit of Germanism and all that that spirit means.

It is essential to heed the warning of Allied disunity engineered by Germany after World War I. Then, the Germans realized that the greatest threat to their aims for the future lay in the attitude of the French people, which, of all the peoples in Europe, were the only ones not to be deceived by German propaganda. In the light of bitter experience ranging over many years, the French refused to adopt an attitude of reconciliation with Germany. Therefore, the Germans set about sowing such discord as eventually achieved its purpose in splitting the French away from the other Allies.

During World War II, the Germans constantly employed their propaganda machine to disrupt relations between the Allies. In Greece, they lent support to the rebel forces; in a lesser degree, their

agents achieved success in Poland and Jugoslavia, and they did their best to arouse distrust and dislike between Great Britain, the United States, and Russia. There can be no doubt that their machinations have played no small part in creating the present strained relations between the wartime Allies—a situation of which Germany may well try to make use if the opportunity to do so offers.

In order to carry out the intention of making Germany a useful and peace-loving member of European society, complete unity between the occupying powers was essential. Disunity and the doubtful intentions of Russia may enforce serious modifications of the original plan. But whatever the future may bring, the prime essential is that Germany shall not be allowed so to profit by discord among her conquerors as to be able to rise again as a menace to the world.

The Spanish Aviation Industry

Digested by the MILITARY REVIEW from an article by William Green in "Canadian Aviation," August 1949.

IN SPAIN, more than 3 years after the conclusion of the war against the totalitarian powers of Europe, the fascist regime of Generalissimo Franco still holds the reins. Franco himself is outwardly unperturbed by adverse world opinion, despite Spain's serious internal economic difficulties.

Spain is vitally important for the defense of Western Europe. It must be admitted that there was some truth in the words of Franco when, in a recent interview with a United States radio commentator, he said, "The Atlantic Pact without Spain is an omelette without eggs."

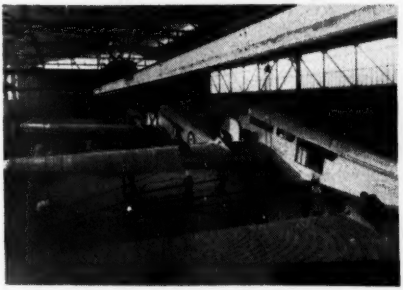
Spanish politics were in a confused state for many years prior to the revolt in 1936 of the Nationalists under Franco. Various attempts to place the Spanish aircraft industry on a firm footing invariably were forestalled by sudden political upheavals. Thus, the outbreak of civil war did not materially affect the output of aircraft from Spanish factories. Owing to the chaotic conditions existing within the industry itself, production was virtually at a standstill in any case, and bombing precluded any efforts on the part of either side to get aircraft factories into production again.

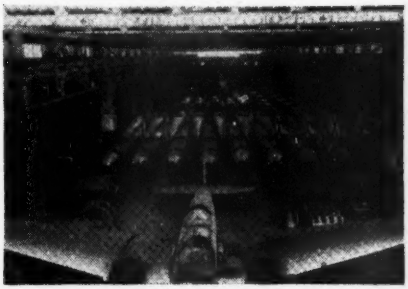
Industry Reorganized

However, during the civil war, Franco discovered the importance of air superiority, and as soon as conditions permitted, he reorganized the Spanish aircraft industry completely. Spanish-built warplanes have completely re-equipped the *Ejercito del Aire* (Army of the Air) which was, for many years, equipped solely with such aircraft as existed in both zones at the termination of hostilities.

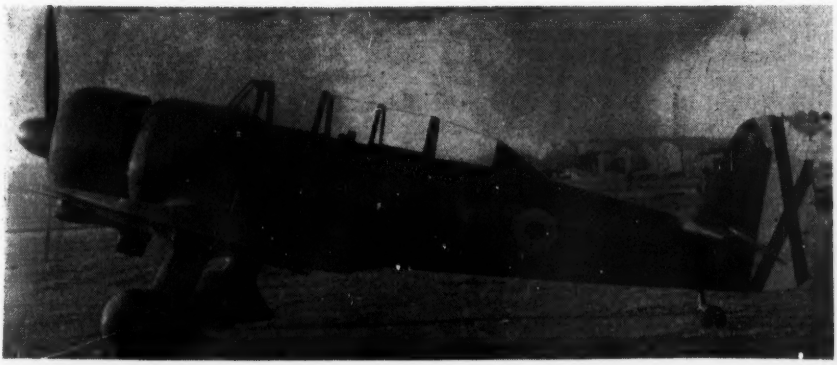
Since 1938, immense sums have been spent on rebuilding and re-equipping Spanish aircraft plants, and Spain now possesses at least three major aircraft manufacturing concerns. These include Aeronautica Industrial SA, which has a modern factory at Carabanchel Alto, near Madrid; Construcciones Aeronauticas SA, with factories at Getafe, Seville, and Cadiz; and Hispano Aviacion, with a new plant at Seville. Two airplane engine factories are producing engines of both foreign and national design, the Elizalde SA and the Hispano-Suiza SA. In addition, numerous component and accessories

Above, the Spanish version of the German *Me-109*, a type used extensively by the Germans during World War II. This plane was produced in a Spanish factory.





Above, left, German *Junkers Ju-52* transports under construction in Spain; above, right, *Heinkel He-111* bombers under construction; below, an *HS42B* advanced trainer.



plants are engaged in supplying equipment to these manufacturers.

It will be remembered that Spain became the operational testing ground for many German, Italian, and Russian warplanes. It would seem that Franco's Nationalist pilots gained a preference for German aircraft for, as soon as the civil war ended, the new Spanish government began negotiating with the Germans for licenses to build various German designs.

In 1939, with war brewing in Europe and the Nazis apparently holding all the cards, the Spanish government thought it wise to start equipping the then newly-formed *Ejercito del Aire* with standard German warplanes.

Trainer Contract

As the first stage in this plan, and in the air force's expansion and modernization program, licenses were obtained to build the *Bucker Bu-131 Jungmann* and *Bu-133 Jungmeister*, primary and advanced training biplanes. A contract for hundreds of these was allocated to the largest of Spain's aircraft manufacturers, the Construcciones Aeronauticas SA (CASA) who commenced production at their Cadiz plant. In 1942, the company began the construction of *Heinkel He-111* bombers at their Getafe and Seville plants, the former producing the wings and the latter the fuselages.

The Spanish-built *Heinkel He-111*, which is now standard equipment with the bomber squadrons, differs little from that used by the *Luftwaffe* during the greater part of the war. The Spanish version is powered by two 1,300 hp Hispano-Suiza liquid-cooled engines which are built at Barcelona, and it has a performance and bomb load similar in most respects to the later German *111s*.

The CASA factories also have supplied numbers of *Junkers Ju-52/3M* tri-motor transports to Spanish paratroop and transport squadrons. CASA-built *Ju-52/3Ms* are of a somewhat ancient model, being powered by 750 hp radials built by Elizalde SA—presumably owing to the lack of a more suitable higher-powered radial engine. They still retain the open dorsal gun position that was used in the bomber version of this aircraft during its early service years with the *Luftwaffe*.

During the civil war, Spanish pilots gained a considerable amount of experience on the *Messerschmitt Me-109* fighter. Thus, in 1942, when it was becoming increasingly obvious that a prime requisite was a modern fighter for Spanish squadrons, the Spanish government obtained a license to build the *Me-109* and a contract was awarded to Hispano Aviacion.

At that time, the *Luftwaffe* was receiving the much-modified *Me-109G*, and it was this type that the *Ejercito del Aire* chose as its standard fighter equipment.

The Spanish production model was redesignated *HS-109J* and was powered by the Hispano-Suiza liquid-cooled geared and supercharged engine of 1,300 hp, driving either the Swiss Escher-Wyss or the British de Havilland three-blade constant-speed propeller.

The most obvious change between the Spanish and German versions is in the lines of the fuselage nose, the familiar drooping cowling of the *Me-109G's* DB 605 engine being supplanted by a cowling having the more pleasing Spitfire-Mustang-type contours.

Armament consists of three 20-mm cannon, one mounted between the cylinder banks and firing through the propeller hub, the others mounted in the wings. Performance is as follows: Maximum speed, 405 mph at 13,780 ft.; cruising speed, 305 mph at 9,840 ft.; climb to 6,580 ft., 1 min. 42 sec.; ceiling, 42,651 ft.; landing speed 68.4 mph; range, 435 miles.

Glider Development

Last year, Iberavia SA was employed in

an extensive program of glider development intended to prove the glider as an economical unit of transportation. To provide an aircraft suitable for training pilots to participate in the later phases of this program, Iberavia prepared a specification for a two-seat advanced training glider which was built by AISA. The glider, known as the *Iberavia IP-2*, was a low-wing cantilever monoplane of mixed construction with an enclosed cabin seating a crew of two in tandem seats with dual controls, and featuring a fully retractable tricycle undercarriage. The *IP-2* has proved very successful and powered versions are under consideration by the manufacturers.

Airplane Engine Industry

The Spanish airplane engine industry consists of two companies, the Elizalde SA and the Hispano-Suiza SA. The Elizalde company was founded as long ago as 1910 and embarked upon engine manufacture in 1925. After the civil war, Elizalde re-equipped and reorganized its plant at Barcelona and commenced producing 750 hp radial engines (basically similar to the Pratt and Whitney Hornet) for use in the CASA-built *Junkers Ju-52/3M*.

Summary

If the storms of war are again to be unleashed, it is certain that the present Spanish government would not side with any communist power. It should be borne in mind that the political factions supporting Franco are also those who triumphed over communism in the civil war. It is improbable that they, having gained control at the price of a heavy toll of Spanish lives, will willingly step down and allow the vanquished to take over the governing of Spain.

The Far East—A Pacific Pact

Digested by the MILITARY REVIEW from an article by Kenneth Hare Scott in "The Fighting Forces" (Great Britain) August 1949.

THOSE of us—and it must be most of us—who watch anxiously the progress of the West in fulfilling the military requirements of Western Union and the Atlantic Pact have taken heart this summer. There has been a bustle of activity to replace the still and calm of 1948, when men talked of the economic and political "aspects" of a united Western Europe and were still half afraid of offending Soviet Russia. Western Union naval maneuvers in July brought together 60 warships of the British, French, and Dutch Navies, and smaller ships of the Belgian Navy. Fighters and bombers exercised over Britain in Exercise *Foil*, which combined air forces of Britain, Holland, and America with British ground defenses. There were Territorial exercises in Normandy and antiaircraft cooperation with the Low Countries. With the advent of July, there was another striking clarification by General Bradley, then Chief of Staff, US Army, of the part which he believed America should play in the defense of Western Europe.

Apart from physical implementation of postwar arrangements, Western Union countries have already made far-reaching plans for standardization of arms and have divided responsibility for their production. So the scene is not unhappy in the West, where in the nature of things we look to our nearest horizon. But in the Far East, we see no reassuring signs, only a hot war carried a triumphant stage forward by forces which we in the West have decided to withstand. Let us take stock of the position as we know it to be.

Conquest of China

Communism has conquered China, for the time being at any rate, and the menace to Southeast Asia, Australia, New Zealand, the islands of the Pacific, and Hong Kong, the Gibraltar of the Far East, has assumed such proportions as to switch the arena of major contest from Europe to Asia. British thought is developing along the line that some form of Marshall Aid should be accorded to Southeast Asia, where communism can be defeated if effective measures are taken in time. A conference may be held between the democratic powers with direct interests in Asia. These would, of course, include Britain and the Commonwealth nations, the United States, France, and Holland. By then, it will be possible to gage the extent of China's subjugation. But at once, the Western Powers must know among themselves the answer to violation of their colonial territory.

The leading communists in China today have been schooled for more than a decade in their "faith," many being trained for ultimate power (which means subservient devotion to the Kremlin) in Moscow. Now they move in to do what they had long planned to do—make China another, and vast, Soviet socialist republic. Some people say that these well-trained Moscow communists will be able to make little impression upon the Chinese way of life, where tradition goes deep. But we must not forget that in a country where comparatively few educated people dominate the masses, a change in the degree and method of domination is bound to find reflection throughout the community. It is the educated Chinese who, in many cases, have partaken of the Moscow communion. Just as in Europe, pockets of intense communist activity will set about breaking up the Chinese cult in favor of centralized bureaucratic rule of a kind we are not permitted to see because it is such a disgrace to our twentieth century standards of life. I am told that already in the Philippines the communists are hard at work and doing very well among the native population who fought so valiantly with the Allies during the Japanese invasion.

Strong communist pressure in Northern Siam and Indo China had led to a statement that some 10,000 British troops, aided by 5,000 from the Royal Air Force, may be protecting Malaya and Singapore for another 10 years. More quarters are being built in Singapore and Kuala Lumpur, which by the end of this year should enable some 1,500 families to be reunited. Then, behind Malaya and Burma, lies India which may, if we dawdle in our affairs farther east, become the one remaining bastion to communism from the East. The whole area of the Middle East, long coveted by Moscow strategists, would then be threatened. A divided India does not make the problem any lighter.

As we begin to realize the mushroom growth of communism, which overnight seems to have enveloped lands where hundreds of millions of people dwell, we are forced to sit up and take notice. What can be done in how much time? Two years ago in Europe none would have believed that by 1949 we should have created a European Parliament, won the vicious battle of the Berlin blockade, to a great extent integrated our forces, and joined in an Atlantic Pact for the defense of the West. All this has enabled one voice to say "No" for many nations in defiance of the mighty voice of geographically spacious Soviet Russia. If we have a lesson yet to learn, it is that the enemy advances underground and he may yet tunnel his way into our midst if we leave the ground too soft and easy. If our experience in Europe is to be adapted to the Far East, we need to act together. We need a defensive pact which will bring the same security to our friends as the Atlantic Pact shows promise of providing for us.

Collective Security

Collective security on a regional basis has supplanted the earlier idea of security vested in a world authority such as the League of Nations, for the very practical reason that nations will react to aggression instantly only if their interests are at stake. All the signatories of the Atlantic Pact would share a common fate if each failed the other. So it is in the Pacific area. A mighty alliance could take shape if it were summoned into being immediately. Manpower would be the lesser problem; organization, training, and equipment, the greater. The moral infusion of an alliance of the free peoples of the Far East would be immense to the wavering spirits. We have not a moment to lose in the Far East if the greater part of the earth's surface is not to become dominated by forces which respect no man's liberty and no God.

In an article written to commemorate the 28th anniversary of the founding of the Chinese Communist Party, Mao-Tze-tung reaffirmed communist China's alignment with the Soviet *bloc* of powers and restated his thesis that there is for China no "middle way." This is what he said: "China now forms part of the 'anti-imperialist front' led by the Soviet Union and can look for friendly help only from that direction. The notion that China would require aid from the United States and Britain is a childish belief. Even if these countries were willing to trade with China, they would be actuated only by the selfish desire to make money or to relieve their own economic crisis." He said a good deal more, but I have quoted enough to dispel any doubts that the new régime in China might share the independent outlook of Marshal Tito.

By way of a postscript, I have just met a Russian woman who spent most of the 1930s in concentration camps in Siberia. She tells me that one of the projects upon which forced labor was used with magnificent results was the road from China to Manchuria—far too elaborate a life line not to have been used to sustain the Chinese communists.

The Influence of Air Forces on Sea Power

Digested by the MILITARY REVIEW from an article by Squadron Leader A. McI. Peacock in the "Royal Air Force Quarterly" (Great Britain) July 1949.

So MUCH heated and even acrimonious discussion has taken place on the influence of aircraft on sea power that, in any review, it is essential to be quite clear as to the meaning of the terms used.

Sea power, as defined by Mahan and Corbett, is, very briefly, the power or ability to use the sea for the movement of your own forces, supplies, and trade, and to deny that usage to the enemy. Its outward symbols are not only the navies of the world but also the merchant ships, liners, coasters, and the port and shipyard facilities behind them. The navies are, or were, the weapons by which those ships were protected from enemy interference and by which the enemy was denied the privilege of unrestricted ocean movement. Navies, or fleet strength, constituted one part of the means by which sea power was exercised and the merchant fleet the other. Fleet strength has never, by itself, been the sole measure of sea power. It is largely by reason of the failure to differentiate these two elements that much of the confusion on sea power arises.

The sea cannot be occupied by ships as armies occupy land. Command of it may be constantly in dispute and need not be held by either adversary. This is as true for

maritime warfare in this air age as for the old surface struggle.

As the only weapon that could influence sea communications and trade, the Navy became a vital need to Britain as a maritime nation. The aircraft brought a new and, for a time, suspected factor into maritime warfare. Its value was discounted for some time by the Navy. But its uses and prime importance have been proved in the testing ground of war, until now the Royal Air Force and air power have displaced fleet strength as Britain's first line of defense. World War I was fought while aviation was in its cradle and it is necessary to look to World War II to see the true portents of the influence of air forces on sea power.

Air Forces and Sea Operations

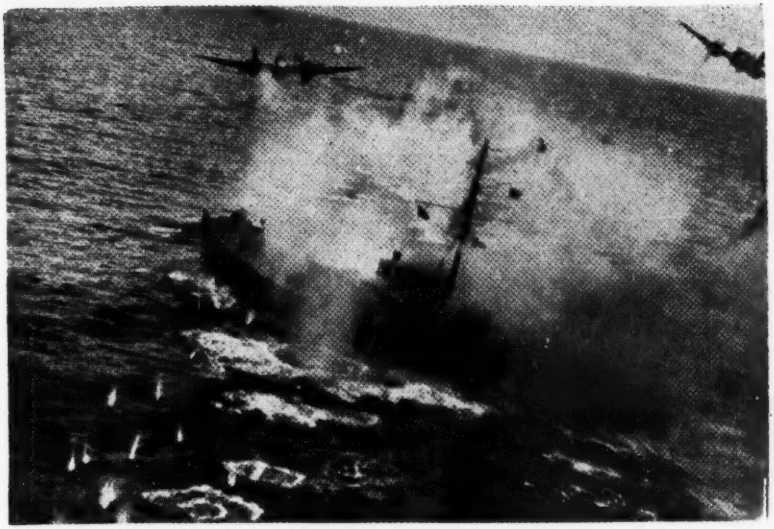
The aircraft which came onto the stage of maritime warfare with numerous and serious disadvantages has now overcome the majority of them. Its superiority in speed over naval vessels and the ability of the small to take on the large has existed for some time. Its inability to remain on patrol for any length of time is compensated by the comparative ease with which successive patrols can be arranged. Its range, and the speed with which reconnaissance intelligence can be brought back, are invaluable. The aircraft can now carry a missile with 10 times more explosive than is ever likely to be fired from a naval gun. Technical progress steadily extends these advantages.

The drawback that the aircraft is not an all-weather, 24-hour weapon is steadily being surmounted. Radar enables it to see and attack by night; training and navigational aids are extending the ability of aircraft, both carrier- and land-based, to operate during any weather.

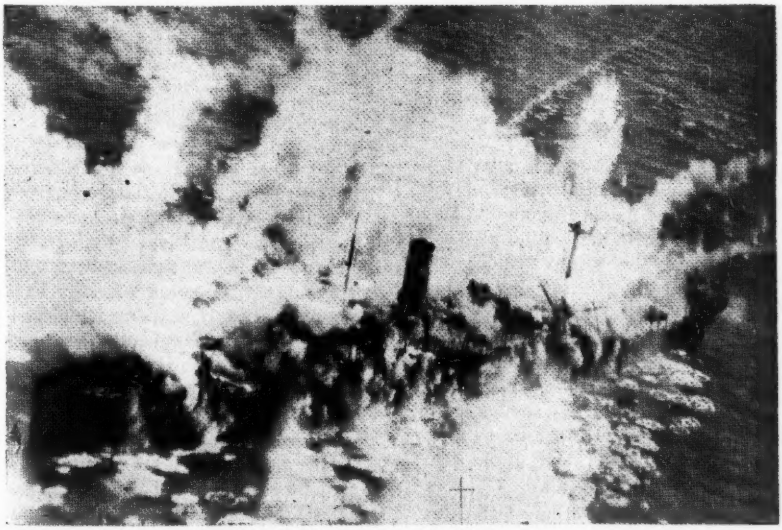
Aircraft provide maritime forces with a strategic advantage not previously enjoyed. Enemy bases could not safely be by-passed without the long and costly process of blockade or land assault; now they can be neutralized by air attack. Island bases are particularly vulnerable to this strategy in that, after the first direct attacks, blockade by air can keep them ineffective. This new ability to ignore enemy bases was ably demonstrated in the American island-hopping campaign in the Pacific. The Japanese bases of Truk, Rabaul, and Ponape were by-passed and their value as advanced bases converted into liabilities as virtual internment camps. The situation even arose in which by-passed island bases were used as practice targets. In the Mediterranean, Malta constituted a similar threat to the enemy's communications to North Africa, but it could never be ignored because it was never neutralized. While torpedo and anti-submarine operations are specialized forms of aircraft employment, the inherent flexibility of aircraft still applies to sea warfare.

Squadrons were transferred during the war from Bomber to Coastal Command, long-range fighters can undertake strike-escort roles, and bombers can be employed on minelaying or attacking submarine pens and shipbuilding yards. This was shown in the raid on the submarine Diesel-engine factory at Ausberg and the bomber attack on Vegesack. Strategical flexibility is a quality also enjoyed by ground personnel: they form by far the larger part of any air force and can quickly be transferred to maritime squadrons from any other duty. This contrasts sharply with the time necessary to exchange army and navy personnel in equivalent trades. The invaluable birthright of flexibility must not be thrown away by over-specialization in aircraft design or aircrew duties to the point that they cannot be used other than in one limited role.

Air forces have the peculiarity that they can be taken to, and operate from, the sea. While limitations are imposed on the size of aircraft, this gives them



Above, British *Beaufighters* in a low-level attack of a heavily armed German ship in Heligoland Bight. Below, another German ship which fell victim to British air power. The author of this article contends that air forces dominate sea warfare even more than land warfare.—British Air Ministry Crown copyright.



an increased advantage of mobility; they can be concentrated at any desired spot on the ocean. With these qualifications, carrier-borne aircraft are not different in use, nature, or potential from any other aircraft, and the use of the term "naval air" in an attempt to create a difference where none exists must be deplored. It is pointless to distinguish between aircraft employed against ships and those used for interception, bombing, or transport, and so to say that the former are an instrument of naval power, or, by using mines and torpedoes, are an arm of the Navy, and the latter of air power. They are all uses to which the immensely flexible weapon—the aircraft—can be put.

The use of carrier-borne aircraft in a prolonged intensive effort does appear to be attended by a particular danger. As fatigue and strain on pilots increase with continuous sorties, so accuracy falls off and a tendency to over-estimate success grows. This danger was dramatically illustrated in the battle off Samar. Six air strikes against the main Japanese fleet in the Sibuyan Sea had reported damage sufficient to render it ineffective when it was largely unharmed and, as a result, caught a fleet of US light escort carriers at close range.

Aircraft and Shipping

In the summer of 1940, as part of the plan for invading Britain, the *Luftwaffe* virtually stopped Allied Channel traffic by air attacks on ports and shipping. In the Mediterranean, the enemy made determined attempts by aircraft to stop shipping going to Malta. In February 1942, only one ship out of a supply convoy escaped destruction. In March a convoy was sunk in the harbor before it was unloaded. In June, out of two large convoys sailing simultaneously, one was forced, mainly by air action, to turn back, and, of the other, only two ships reached Malta.

We were not in possession of the Cyrenaican or North African coast and could offer no air protection to the Malta convoys. Yet, as soon as a land advance permitted air operations from bases affording cover to the route, a convoy reached Malta without loss. While the enemy held the air bases around the Central Mediterranean, it became an Axis lake through which we could not pass a convoy.

In the Bismarck Sea, in 1942, a Japanese convoy was found and entirely destroyed by land-based planes. This success was repeated near Ormoc in 1944. In battles within range of land-based aircraft, they showed a superiority over carrier-borne air forces. Air superiority in those areas was gained by the combatant that occupied the airfields covering the sea areas concerned.

The effectiveness of aircraft against merchant ships is so complete that, provided all the waters around it are within range, an island or base can be blockaded by air alone irrespective of relative fleet strengths. It is of no value to a combatant if not a man or spar of his fleet strength is injured while his cargoes and transports are sunk. The principle that surface navies cannot remain in waters in face of even local air superiority has proved equally applicable to merchant ships.

The value of aircraft against submarines was long in question. In fact, up to the spring of 1943, aircraft accounted for only 25 percent of the total casualties inflicted on German submarines. In the last 2 years of the war, they so far outstripped surface craft in effectiveness that, by 1945, land and carrier-based aircraft had accounted for nearly 60 percent of the total destroyed at sea. Frequently, the presence of an escorting aircraft resulted in a convoy escaping any loss. Statistics may often be misleading, but these show, beyond possibility of challenge, that the aircraft was the decisive weapon against submarines and so it should be in the future.

It is true that submarine developments

in the last few months of the war, particularly that of the schnorkel and the progress towards design of the true submarine, are causes for great concern. They have, at present, reduced the effectiveness of aircraft operating against them. But we should remember that science alternates between favoring first the attack and then the defense. If we realize the vital importance of mastering these submarine developments and of research in countering them, an answer should not be beyond our inventive capacity. The tactical advantages of aircraft working against submarines, independently or in cooperation with the escort vessels, are so great that research should be directed towards restoring the eyes to the aircraft, so that schnorkels and even true submarines can be located and attacked from the air.

The success of the island campaign in the Pacific enabled the United States to impose an aerial blockade on all Japanese shipping to Formosa, the Dutch East Indies, and the South China Seas. The aerial mining of the Japanese shipping routes around her homeland in 1945 had, by August, completely stopped all raw material shipments to Japan and reduced cargoes of food to a small fraction of earlier tonnages. When it is realized that 90 percent of the oil, 88 percent of the iron, and over 20 percent of the food consumed in Japan were imported, the magnitude of the disaster to Japan may be gaged. From January 1945 onwards, when aircraft were within range of the Japanese mainland, aircraft accounted for more than double the number of ships sunk by submarine. The sea blockade and attrition of the Japanese merchant fleet from a peak of 10 million to less than 1 million tons were themselves sufficient to have insured the defeat of Japan.

Late in 1944 and early 1945, when Germany wished to assist her hard-pressed Western Front with divisions from Norway, special shipping was collected to withdraw two to three divisions a month. By March 1945, owing to air attacks and air mining, the flow was only one division in 6 weeks, and by April, the movement was negligible. This was a painful reminder of the influence of air forces in exercising sea power which Germany had first demonstrated to us in those same waters in 1940.

Aircraft can lay mines with great accuracy, existing mine fields can be flown over, and fields suspected of having been swept can be refreshed. It is impracticable if not impossible to mine rivers, canals, and defend harbors by any means other than aircraft. Some 73,000 mines were laid by the RAF in offensive mine fields, and some 600 German ships were sunk by them. Mines laid have a second and sometimes as important effect as shipping actually destroyed: all movement in a harbor or canal may be brought to a standstill by the existence of unswept mines. For the first time, air forces can stop and hold an enemy.

Air Force Effect on Fleets

The clearest thinking is essential in assessing the influence of air forces on the constitution of surface fleets. It must discard all crumbling conventions, whether they have been clothed with a mantle of tradition or not.

The battleship was the first ship whose retention was challenged by aircraft and, being the backbone of all fleet strength, the challenge has been resisted fiercely. The battleship's primary purpose was to accept battle from the heaviest and most powerful enemy ships. Now, the most potent weapon against surface ships is the aircraft—of 10 Japanese battleships sunk by US forces, five and a half were credited to aircraft. The battleship's armor may keep out missiles, but the ship's structure cannot stand the explosive forces of heavy bombs. It cannot support its light forces against air superiority, and the power that

enjoys air superiority does not require its assistance. It is not permitted to get near enough to opposing fleets to use its weight. It requires aircraft to protect it, and, like the war elephant and knight in armor, is fated to disappear.

Bombardment of enemy coasts can be carried out by monitors, cruisers, rocket ships, or aircraft, and, as soon as aircraft becomes an all-weather, 24-hour weapon and can defend the task force against surface attack, the battleship will relinquish its last usefulness.

The need for cruisers as the eyes of the fleet and for commerce protection falls away as these duties are assumed by aircraft. The days of the large 10,000-ton cruiser may well be counted with those of the battleship.

Conclusions

Sea warfare is even more dominated by air forces than is land warfare. It has become axiomatic that the air war must first be won over the sea before ships can operate on that sea. With fleet strength and the merchantman both compelled to acknowledge the mastery of air forces in offense and defense, the need for fleet strength depending on gun power dissolves. Navies cannot operate without air protection, and, if permitted to operate, their duties can more effectively be carried out by aircraft.

Enemies and potential enemies should never be underrated, and we should assume that they are as capable as we are of reading the signs of the last war. This, and what we know of our only likely enemy's aircraft and naval-building policy, make it certain that his maritime offensive—for he cannot fail to have seen how vulnerable our merchant economy is—will be waged as determinedly as Germany ever waged it. A wise adversary will give us no time in which to perfect our defenses. More than ever before, we must review most carefully the allocation of our defensive effort and financial resources between the services. Protection of our sea communications is absolutely vital and we must put our energies into those weapons on which we can rely and not into those which, while valuable in the past, belong to the past.

The misconception that a large navy is the essential and primary weapon to control the sea and the security of our sea lanes must be discarded. In the days when there were only sea and land forces, there was no alternative; today there is. The whole purpose of command of the sea is to pass friendly cargoes and forces over them and to deny such passage to the enemy and not to sail warships to and fro. An ocean of warships while our mercantile trade and sea communications were cut would be valueless to us.

The Continent of Europe cannot be moved away from our doorstep. Our trade routes converge in the sea areas around land-mass extremities and consequently around potential air bases. Our convoys and surface fleets will always be threatened by air forces from the European mainland, and only our own air forces can protect them.

Sea power, by its very nature, is not challenged by air forces. It is the method of securing and exercising that power that has now changed, for the aircraft has established itself as a more effective weapon than the warship in the protecting and offensive roles of exercising sea power. With our strong naval traditions, it has taken a world war to convince us of these fundamental truths, but, as a nation dependent for our very existence on our maritime commerce, we should be well advised to apply the principles of lessons learned.

The German Officers' Corps

Digested by the MILITARY REVIEW from an article by J. H. Morgan in "The London Times," reprinted in "The Australian Army Journal," April-May 1949.

THERE is an illuminating German document in the American archives at Nuremberg. It was written in November 1945, by General Halder, Chief of the General Staff until September 1942, when he was held in custody at Nuremberg. Its high representative character may be judged by the fact that two field marshals, von Brauchitsch and von Mannstein, and two other generals, Warlimont and Westphal, had a hand in it.

The document begins with the astonishing assertion that the Control Commission of 1920-1927, in its final report, which has never been published, gave von Seeckt a clean bill of health by declaring that Germany had faithfully carried out all its military obligations under the Treaty of Versailles. In fact, the Commission reported the exact opposite. The audacity of this statement is less important than the significant revival of the old propagandist pretense that Germany began to rearm only when her former enemies failed to follow her pacific gestures.

Hitler's Interference

General Halder proceeds to elaborate on this vindication of the German officers' corps. His first objective is to represent the officers' corps as undefeated, or, what amounts to much the same thing, as defeated only by the paralyzing "interference" of Hitler. All military failures after 1941-1942, were, he declares, due to what he calls "the complete elimination by Hitler of all military influence in the conduct of the war."

For the triumphant military successes preceding that fatal year, he is apparently prepared to give the officers' corps full credit. The only proof, if proof it can be called, which he adduces for this proposition is that 11 field marshals and the same number of full generals were retired during the war. The implication appears to be that they were summarily dismissed for taking objection to Hitler's "interference," and that their successors had no option but to carry on for fear of being court-martialed. He gives no evidence whatsoever of any such court-martial proceedings ever having taken place.

The truth is that, as General Telford Taylor contended in his speech for the prosecution of the General Staff at Nuremberg, the German commanders in the field always had the option of voluntary retirement if they did not approve of Hitler's intervention.

General Halder's essay clearly reveals the new genesis of an old legend, the legend of the "Stab in the Back," a catch-phrase coined by the officers' corps in 1918-1919 to explain away defeat. This is a counterfeit coin but one which acquired an enormous circulation in the Germany of that day.

The military caste indoctrinated the German people with the fable that the Army had been defeated, not by the enemy in the field, but by revolutionary elements at home and on the lines of communications. The officers' corps, inspired by Ludendorff, accused the socialists of being the culprits. In due course, Hitler took up the cry and exploited it to destroy the Socialist Party. Paradoxically enough, Hitler himself is now cast for the role of assassin. The importance which the German officers of today attach to the diffusion of the fable of Hitler's interference in strategy and tactics as the cause of their catastrophic defeat may be measured by their statements in captivity.

Rundstedt's Version

The utterances of von Rundstedt are an outstanding example. He sought, in one interrogation as early as July 1945, to explain away his defeat in the West. He asserted that, on a critical occasion at the very outset of the Battle of Normandy, his tactical operations were paralyzed by an order from Hitler forbidding him to move two *panzer* divisions without the *Fuhrer's* consent. He adduced no proof of this.

The truth of the Battle of Normandy is that von Rundstedt's tactical operations were paralyzed, not by any orders from Hitler, but by the total disruption of the movements of his troops owing to Allied ascendency in the air. There is no documentary evidence whatsoever of such orders being given by Hitler until as late as 21 January 1945, when, in a captured "top secret" document, he gave orders that no division should be engaged without its commander being satisfied that Hitler personally approved it. It is the command of a man in the last stage of hysteria. One is reminded of the scathing observation of Lord Justice Lawrence at Nuremberg in 1946 on the miserable equivocations of the five field marshals, von Rundstedt among them, when they gave evidence for the defense of the German High Command and General Staff:

"When it suits their defense, they say they had to obey, but, when confronted with Hitler's brutal crimes, which are shown to have been within their general knowledge, they say they disobeyed."

Halder's second proposition is an attempt to vindicate what he calls the "chivalrous" conduct of the war by the Army leaders. He invites the reader to believe that the German generals were "the kindest men that ever struck with sword." They were all "shocked," so Halder says, at Hitler's atrocity orders, in particular that for "terror warfare" in Russia, the slave-labor order, the hostages order, and the commando order.

Army outrages against the civil population were, he asserts, even when committed (as they often were) in the operational zone of the armies, entirely the guilt of the Elite Guard *(SS)* and the SS Security Service *(SD)*. Halder sums up by asserting that the High Command secretly agreed that all these orders should be sidetracked.

Every one of these pleas is disproved by German Army documents discovered since Halder wrote, and particularly by documents which the American military authorities have discovered in the last 2 years. Many of them were put in evidence in the trial of 2 field marshals and 10 generals by the American War Crimes Tribunal. It was then proved conclusively that these high-ranking officers not only dutifully carried out all of Hitler's atrocity orders, but they actually anticipated them.

Unfortunately, the evidence in this great trial, as in the case of the 11 other concurrent trials, has never been published in England. In another great trial, now just ended, that of Field Marshals von Leeb, Sperrle, and von Kuechler, together with nine generals, the most appalling evidence in the shape of captured German Army documents has been submitted. The authenticity of these documents has not been challenged by the defense. They establish that all the most notorious of Hitler's atrocity orders were, in the words of General Telford Taylor, "passed down the whole chain of command from Army Group to Army, from Army to Army Corps, from Corps to Division, and right down to regimental units."

Nuremberg Judgment

At the same time, instructions were given to the *SS* and *SD* units to report to the Army commanders the execution of these orders. Report them they did, in a sickening series of documents setting out, in gruesome detail, the exact number of

innocent civilians murdered in cold blood in each particular place on each particular day.

It is opportune to recall what Lord Justice Lawrence, in delivering judgment at Nuremberg in 1946, said of "this ruthless military caste," as he called it, who had "made a mockery of the soldier's oath of obedience."

"The truth is that they actively participated in all these crimes or sat silent and acquiescent, witnessing the commission of crimes on a scale larger and more shocking than the world has ever had the misfortune to know."

Everything in the newly discovered documents confirms these words. It is indeed quite clear that Lord Justice Lawrence and all his colleagues were convinced that justice would not be done by the conviction for war crimes, quite independently of the "counts" of "conspiracy" and "aggression" of Keitel and Jodl alone, unless the other field marshals and generals implicated were also brought to trial.

British omission to participate in the two great American trials of the High Command in 1947-1948, and thereby to give effect to the recommendation of the International Tribunal of 1946, may well have grave reactions in Germany. It will surely give aid and comfort to the repatriated German officers in the circulation of a legend that Jodl and Keitel were wrongly convicted and that the British government now regrets that they were ever brought to trial. The result, in that case, will be not only to discredit the trials of 1946 but to nurture in Germany the growth of what has been called a "legend of guiltlessness."

It is rather ominous that the German legal profession, as represented by 25 counsel for the defense in the Krupp trial, grew bolder every day. They did not hesitate to contend that the laws and usages of war, in the matter of war crimes, had no application to the second world conflict at all. Their leader, in cross-examining a certain British witness for the prosecution in the Krupp case, asked him whether it was not a fact that in World War II England was as guilty of outrages as Germany herself. Yet all over Europe, at the present moment, there are tens of thousands of broken men and women, ruined for life in body and mind by the unspeakable horrors of their deportation and forced labor by the German Army commanders.

Antitank Weapons

Digested by the MILITARY REVIEW from an article in the "Journal of the Royal United Service Institution" (Great Britain) May 1949.

THE problem of finding an antidote to tanks was only partially solved when large-scale fighting ceased in 1945. Four types of antidote had evolved, but all four suffered from serious drawbacks. These antidotes were as follows:

1. HIGH-VELOCITY FLAT-TRAJECTORY GUNS.—Their principal drawback was the fact that, in order to deal effectively with heavy tanks, the size, weight, and unwieldiness of these guns had to be increased progressively. Starting the war with 20-mm automatics or with shoulder-operated antitank rifles, belligerent nations finished it with 17-pounders, 88-mm and similar monsters. Guns of this size are not too unwieldy if mounted in tanks or on self-propelled mountings, but as

towed equipment they are much too big and unhandy for manhandling in the forward zone of the infantry battle. Whether mounted in tanks, on self-propelled vehicles, or on towed two-wheeled carriages, guns of this size are too big for easy transport with airborne forces, or for floating across rivers on improvised rafts or local boats.

2. MINES.—These, when used in great quantities, provide perhaps the most formidable antidote to tanks, especially as they will always remain equally effective regardless of the size or weight of tanks. But their disadvantages are many.

They are almost entirely a defensive weapon. Though their use may protect a force holding a defensive position or a force withdrawing, they are not of much value for protecting advancing forces against sudden counterattack by armor. They require some considerable time for laying. Unless their use is coordinated at a high level of command, they may become as dangerous to one's own side as to the enemy. To be really effective, they must be used in very large quantities, and careful arrangements must be made to cover them by fire.

3. ROCKET-FIRING AIRCRAFT. — These, used as an offensive weapon against crowded masses of hostile armor, as at Falaise, proved to be a most formidable destroyer of tanks. But favorable conditions such as these for bulk slaughter of tanks must be produced by skilled generalship and hard fighting. Only rarely will massed targets of that kind offer themselves. Far more frequently, hostile tanks will have to be destroyed when they are widely deployed and dispersed. Such targets have to be located and destroyed when our own infantry are already very close to them, perhaps sometimes even surrounding them. Such a task is not a reasonable or safe one to expect of fast single-seater aircraft.

Theoretically, no doubt, it should be possible to devise some method whereby the foremost infantry could call for the aid of a rocket-bomber to destroy an individual tank and indicate to the pilot the exact position of the tank. In sober fact, all who have experienced the difficulties of air/ground cooperation must realize that such ideas can never be regarded as practicable in the rough-and-tumble of forward zone fighting.

As a destroyer of armor in bulk, under favorable conditions in the hostile back areas, air power contributes at times a factor of overwhelming effect. It contributes little or nothing towards the problem of the single tank operating in close country in close proximity to our own troops.

4. SHOULDER-OPERATED INFANTRY ANTI-TANK WEAPONS.—These vary in design and effectiveness from home-made "Molotov cocktails" to piats, bazookas, *panzerfausts*, and similar arms. Most of the hand-thrown grenade types of weapons bear rather too close a resemblance to the salt which one is advised to put upon a bird's tail. It was the development of hollow-charge projectiles, coupled with new and unorthodox methods of projection, which first put into the hands of the infantryman a really practical and formidable tank-destroying weapon. It is now true to say that an isolated tank, unprotected by its own infantry, should succumb to the opposing infantry if they can get within 30 yards of it. This is a most valuable accession of fighting power to the infantry, but it is still not quite enough.

Even if armed with piats, or bazookas in large numbers, but not provided with antitank weapons of longer range, infantry cannot as a rule withstand the pressure of an armored formation that applies its fire power from a range of several hundred yards. Unless the piat-users can close with the enemy tanks, they can do nothing to suppress the fire power of the enemy armor. If the latter is pro-

Antitank weapons, such as those shown here, should be supplanted by a more effective weapon, in the opinion of this British writer. As a solution, a new "aerial torpedo," capable of straight-line flight up to 1,000 yards and fired from a smooth-bore tube mounted on a low-wheeled carriage, is suggested. Above, a 37-mm antitank gun in action against the Japanese on Guam in 1944; flat-trajectory guns of this and higher caliber tend to become unwieldy and difficult to manhandle. Right, the 3.5-inch Rocket Launcher, M-20, is a new US antitank weapon, but the author believes such weapons are too inaccurate. Below, a US 75-mm recoilless rifle.—US Army photos.

tected by its own infantry, the tanks will be immune to anything except high-velocity projectiles with an effective range of several hundred yards. There will frequently be occasions, such as airborne operations and river crossings, when it is impracticable for infantry to be accompanied by the heavy equipment which alone, as matters stand today, can produce the requisite flat-trajectory "punch" to deal with modern heavy tanks at ranges of several hundred yards.

A New Weapon

There seems, therefore, to be a need for something new in antitank weapons. A weapon is required that is capable of destroying the heaviest tank by direct flat-trajectory fire at ranges up to, say, 1,000 yards. If we stick to orthodox gun design and ballistics, such a weapon will be too big and heavy to accompany the infantry everywhere. Therefore, we must break new ground and make use of one or more of the new ideas in propulsion of projectiles.

The projectile itself must travel along a practically flat trajectory to simplify ranging. It must strike the target with a high velocity, though it need not necessarily have started with a high muzzle velocity. It should be of considerable weight in order to contain, in hollow-charge form probably, the necessary explosive charge to puncture heavy armor. But its launching apparatus must be sufficiently light to be manhandled easily in the forward zone, and sufficiently inconspicuous to be able to occupy direct-fire positions without attracting too much notice.

A projectile of rocket type would fulfill all these needs, but rockets normally are not sufficiently accurate for this type of fire. Great accuracy will be required, because each projectile will be heavy and bulky in proportion to the weight and size of the launching apparatus. Each projectile might well be a one-man load. Users will not be able to waste rounds in ranging or "spraying the target." The ideal must be like tiger-shooting: one shot, one kill. How can this rocket projectile be given extreme accuracy?

The principal inaccuracy of rockets occurs during the early part of their flight, before the rocket-charge has imparted to the projectile sufficient velocity to fly straight and flat. Unlike "orthodox" projectiles, the rocket increases in velocity as it goes (up to a point), instead of losing velocity. What is needed, therefore, is some form of propulsion to impart a certain initial velocity, sufficient to carry the rocket through this early and critical part of its trajectory, until the self-contained propulsion takes effect. This initial velocity might be given by firing the rocket from a "non-recoil" gun without producing the heavy stresses and strains inseparable from normal gun design.

Even so, this initial propelling thrust would have to be rather large unless some additional refinement was added to give the rocket perfectly straight and level flight throughout its trajectory. Any "orthodox" projectile, such as one propelled by a single initial thrust, is bound to follow a parabolic or curved flight, the degree of curvature varying with the weight of the projectile and inversely to the initial thrust. The projectile now under consideration must be heavy. Until the rocket-drive takes effect, its trajectory will be that of an "orthodox" projectile. The only way to obviate this would be to provide the projectile with small wings and fins, thus using aerodynamics to neutralize gravity and keep the trajectory flat. The V-1 flying bomb was a projectile whose trajectory was not parabolic but flat and parallel with the ground for many miles. By the aid of aerodynamics, it should be possible to get non-parabolic or straight-line flight up to a range of 1,000 yards.

The new antitank weapon thus begins

to take shape as a sort of "flying pencil" or "aerial torpedo" which can be launched from an apparatus fit to live and move in the forward zone. Its trajectory never rises more than a few inches above the line of sight during a flight of 1,000 yards.

During actual flight, this "torpedo" should have excrescences, such as small wings, and possibly a tailplane and fins. These, if permanently protruding, would render the projectile an awkward load for manhandling in the forward zone or on the lines of supply. The vitally important accuracy of the projectile will depend upon these protrusions not becoming broken or damaged during transit. For this reason, as well as to facilitate discharge from a non-recoil gun, the wings and other aerodynamic protrusions could probably fit into recesses within the cylindrical projectile itself until this leaves the muzzle. Some system of springs, actuated by the shock of discharge, would force these aerodynamic excrescences into their working position as the "torpedo" leaves the muzzle. Thus, the shape of the projectile before firing would be that of a cylindrical pencil without excrescences—quite a handy object for any form of transport or for manhandling.

Such a projectile could easily be fired by a long smooth-bore tube mounted on a low-wheeled carriage. The whole equipment could be considerably more mobile than the 6-pounder gun, but its hitting power could be greater than that of the 17-pounder. The component parts of the launching apparatus could be so light that the whole weapon could be made easily divisible into convenient one-man or two-man loads. This would permit the equipment to be brought forward unostentatiously into action on forward slopes, or other exposed positions, without its exact position being detected until after it had achieved considerable execution.

Such a weapon would go far toward restoring to infantry its former supremacy of the battlefield. As matters now stand, and taking into account only the existing antitank weapons, the mere proximity of armored forces is enough to drive "soft" troops into the immobility of mine fields or tank-proof localities. It is enough to prohibit certain airborne operations or water crossings which might otherwise—were it not for the armored threat—offer valuable tactical results.

In naval warfare, the evolution of the torpedo redressed the balance between light craft and the heavily armored battleship. The evolution of the "aerial torpedo," when developed as a normal infantry weapon, may redress the balance in land battle between "soft" troops and heavy armor.

Our military policy is to provide our soldiers, sailors, and airmen with superior equipment which will multiply as much as possible their power as fighting men.

Dr. Karl T. Compton

Coup Operations

Translated and digested by the MILITARY REVIEW from an article by Ake Sundelin in "Ny Militar Tidskrift" (Sweden) No. 1, 1949.

A COUP operation is a military operation executed in such a way as to surprise the defender and to create an advantage for the attacker.

Generally speaking, there are two purposes of a coup operation. First, its purpose may be to obtain influence or power. Second, it may be intended to inflict serious damage on a country, such as on its defense installations or resources. Measures of the latter type open the way for an attacker to obtain considerable advantage for himself, even though he uses limited or very small forces. This is especially true just before or during the early phases of open hostilities. A coup can also be carried out under peacetime conditions, as a preparation for subsequent operations.

The Objectives of a Coup

It may be expected that the objective of a coup operation will be one or more of the following: the national defense, the country's administration, the nation's natural resources, manufacturing facilities, or the inhabitants themselves. The choice in any particular case naturally depends on the objectives of the attacker's subsequent operations. Selection of the target is influenced by many different factors which must be taken into account at the time of the attack. One factor which is always likely to be of influence is the desire to create substantial advantages for the attacker or to inflict serious damage on the adversary with only a limited engagement of forces.

In both civilian and military defense, it should be expected that the objectives would be installations and supplies of various kinds. By seizing or destroying these, the technical and material resources of the defense can be seriously reduced. The same is true, broadly speaking, where coup operations are successfully carried out against war industries. The effects of such operations are immediately felt when the affected industries are engaged in the final stage of a manufacturing process. Damage inflicted on communications can seriously hamper and retard vitally needed transportation and may be of catastrophic consequences to the defense. This will be especially true where transportation concerned with mobilization and concentration is affected. Coup operations against laboratories and other research establishments may have serious future consequences, due to the fact that irreplaceable apparatus or instruments may be destroyed or valuable research data may be seized by the enemy.

In the sphere of administration, coup operations directed against various elements of a country's central administration, including the higher military staffs, may give an adversary particularly valuable information concerning defense plans and resources before actual warfare has begun. After the outbreak of war, such operations can give the attacker certain advantages, due to the fact that difficulties and chaos are produced in the conduct of the defense. Control of the propaganda and communication facilities of a nation in the early stages of a war gives the attacker an opportunity to undermine a nation's army and to reduce the nation's power of resistance. The nation's defense may also be disorganized by false communications.

In the field of a nation's resources, as in its military defense, industrial establishments, warehouses, and communications are of the highest importance. They

are therefore natural objectives of coup operations. Perhaps the quickest results are obtained by an enemy through efforts against stocks of finished products, or against industries engaged in the final stages of a manufacturing process. If measures are taken against industries which produce raw materials or partially finished products, such as mines or steel mills, the effects are not generally discernible at once. Later, they might have catastrophic consequences. Electric power plants and transformer stations must be regarded as probable objectives of enemy action. Also, water and gas works and other public installations can certainly be considered as objectives. Damage done to installations of this type may produce serious results, not only immediately but on a long-range basis.

Coup operations may also be aimed directly or indirectly at a nation's population by spreading disease. Owing to developments in bacteriological and parasitic warfare, terrifying results from coup operations of this type are possible. Either bacteriological or radio-active agents may be used directly against human beings. But it would appear that widespread results could be obtained indirectly by contaminating water and food supplies or by destroying harvests and killing cattle.

Preparing for a Coup

Preparations which must be made for a coup naturally vary with respect to their nature and extent. The preparations depend on the goal and on the anticipated difficulties. World War II presented numerous instances of coup operations on a large scale. The type and extent of the preparations vary, but there are certain things that must be done in all cases.

First, a suitable objective must be selected. This choice is not made at random but is generally an integral part of a general plan directly connected with the plan of military operations.

The planning of a coup is based on prior investigations. The study of objectives includes the use of maps, photographs, technical diagrams, and other information found in catalogs, newspapers, periodicals, or reference works. An objective may also be studied on the spot. Investigations of the latter type may be made either by persons sent out especially for the purpose or by contact men.

The chances of obtaining the necessary information will be considerably augmented if contact men can be procured who are connected in some manner with the objective to be investigated.

It will also be highly desirable to procure collaborators or contact men who are well acquainted in the locality where the coup is to be executed and who will be able to collaborate actively in its execution.

Organization Required

The execution of a coup will, ordinarily, be carried out by a group of individuals. This group may vary from only a few individuals to a large military force.

The mission may either be assigned to a group of persons in the country planning the operation or entrusted to political sympathizers or other contact men in the country where the coup is to be executed. Naturally, a combination of both of these methods can also be employed.

Where the first method is used, the force will usually be instructed, trained, and equipped in the home country. Later, the force will be secretly or openly transported to the country in question. Where the second method is employed, the instructions for the execution of the coup operation as well as the necessary equipment are, in most cases, supplied by foreign collaborators.

Anti-Coup Defense

The above considerations automatically lead our thoughts toward certain measures

to be taken against coup operations. These measures may be divided into those calculated to render preparations for coup operations difficult or impossible, and those calculated to limit or thwart such operations.

Measures against coup operations are primarily aimed at hindering the planning of such operations. It is of great importance, therefore, that everything published concerning the possible objectives of a coup be so composed that the material cannot directly serve the wrong interests.

Foreign agents are often forced to take costly and dangerous risks in securing information if caution is observed in publishing material relative to new mines, power plants, or other similar installations. This is also true as regards news which, in itself, appears to be of little significance and could not be classified as secret.

It is evident, therefore, that if necessary caution is to be observed, a clear idea will be required concerning what objects in one's own country are or could be actual objectives of a coup. A clear idea of possible objectives is also necessary in order that various measures may be taken to protect them.

Measures taken to hinder the preparation of coups should be the concern of police forces, civil defense agencies, and certain military organizations. In time of peace, police and military missions in this field should be dominant. Civil defense can only assist in educational activities and provide some personnel on a voluntary basis during peacetime. Obviously, planned activities of various types, especially those in which there is cooperation with police, the home guard, or local draftee contingents, are to be included under this head.

The measures which must be taken by these organizations to prevent coup operations, when such operations are first being planned, present entirely different aspects in time of war. Not only the military defense, but also civil defense and the police, encounter many difficult situations. For example, fire-fighting units are ordinarily not part of the civil defense organization in peacetime. However, such units play an important part in controlling coup operations. Therefore, they should be a part of the defense forces at all times. The distribution of the defense tasks among the various authorities is a very difficult matter. Generally speaking, where "foreign-political" or military methods are employed, the defense force appears to be the proper one to intervene. If "domestic-political" means are to be employed, police measures will probably be taken in most cases.

Effective anti-coup defense calls for prior organization. First of all, an inventory of the actual targets must be made and kept constantly up to date.

Inasmuch as coup planning and coups may occur at other than war periods, planning for defense against coups also must be conducted in time of peace.

Coordination of anti-coup defense measures must be realistic. The authorities concerned must keep one another well informed on the various tasks to be performed and on the measures which have already been taken. Tactical coordination, possibly by a common commander in areas where action must be taken to thwart a coup, will probably be necessary.

One of the most important actions to be taken is to reduce the time required for organizing anti-coup defense units. The trend appears to be toward using small, well-trained, well-armed units which are capable of quick intervention. Arming the personnel working in vital installations and institutions would seem to offer many advantages.

In anti-coup defense, even more than in general defense, knowledge of the

enemy's plans increases the chances of disrupting them. Efficiency of the intelligence service is, therefore, of great importance.

Discontent and unhappiness on the part of the population are of assistance to an adversary in obtaining willing contact men and collaborators to prepare and execute coup operations. In anti-coup defense, therefore, the removal of these contributing causes of disloyalty to the greatest degree possible is important.

Conclusion

Anti-coup defense within the framework of national defense is highly important. All of the people of a country may have a part in anti-coup defense measures, even perhaps to a greater degree than in other types of defense.

Russian Armor

Translated and digested by the MILITARY REVIEW from an article in "Militaer Orientering" (Norway) 25 June 1949.

THE only soldiers outside Russia who are really familiar with the Russian Army are the Germans, who were at grips with it for 4 hard years. By piecing together various German accounts, a clear picture of the equipment, morale, and quality of the Russian armed forces can be obtained.

The universal German opinion is that most Russian weapons were amazingly good, even in 1941 when the German invasion started. Russian rifles were more modern and capable of a higher rate of fire than the German rifles. Russian machine guns, also, were excellent. Mortars were so simply constructed and so crudely manufactured that they appeared to be the work of village blacksmiths. But the Russian mortars were extremely effective, and their crude appearance was offset to some extent by their high rate of fire.

In the matter of tanks, however, the Russians had their greatest advantage. In fact, the Russians had the greatest need for tanks, because the German hope of victory was based, primarily, on the decisive action of their own tanks. Unfortunately, at the beginning of the war, the Russians were not able to turn their technical advantage in tanks to account until it was too late to influence the outcome of the fighting. This fact was not realized at first, but it is of great significance in explaining what happened in 1941.

When the Germans launched their invasion, the Russian tanks were only models which had been built during the second 5-year plan, and they were becoming antiquated. The Germans were mainly using tanks dating from 1933 to 1937. The Russians had more tanks than did the Germans. But the Red Army lost its advantage in numbers through failure to concentrate its tanks as the Germans did, and through lack of skill in employment. The result was that the Red Army lost most of its tanks by the end of the summer in piecemeal destruction at the hands of the skillfully maneuvered *Panzerdivisionen.*

New models of Russian tanks, however, were designed while the Germans were engaged in the west. These were now ready for manufacture and included the T-34 medium tank and the heavy KVI. These tanks proved far superior to the German types.

The T-34 was first used at the end of the summer when the Germans were assembling their forces before Moscow. In 1942, new models were turned out in great numbers. During the years when the Germans

were prevented from manufacturing tanks under the terms of the Versailles Treaty, the Soviet government had offered Germany access to its proving grounds at Voronesh and Kazan. The Germans profited from this assistance and developed their light Panzer I and II tanks, which were used in the invasion of Poland and France. The Russians also benefited from this early collaboration, as indicated by the fact that their T-37 was similar to the Panzer I, and its successor, the T-60, resembled the Panzer II. They also constructed the T-35, which resembled the Borsig tank that the Germans tried out in the invasion of Norway.

But none of these tanks proved capable of meeting requirements. In 1941, the Russians were obliged to depend mainly on the heavy T-28 tank, until they were able to replace this with the new KV model. The KV also showed the German influence, though it was somewhat heavier than the Panzer III and IV which the Germans themselves had constructed. The KV was followed by the Stalin tank.

In the meantime, the T-34 had assumed considerable importance. In the early 1930s, the American inventor, Christie, had designed a very fast tank which was especially promising. The Russians purchased a trial tank, made a few improvements in it, and brought out a medium-heavy BT tank (cruiser). The Russians manufactured the BT tank on a large scale until 1936, and it became the nucleus of their armored arm. The BT was considerably more dependable than its imported prototype, but the armor was light, a thing the Russians paid dearly for in 1941. From the BT, however, was developed the T-34 type. The latter had thick armor (52-mm), a gun of heavier caliber (76-mm), and it was faster (38 mph) than

New Russian tanks being delivered from the factory to the front lines during the Russian counteroffensive in the spring of 1942.

any tank the Germans or any other nation had at that time. Other advantages of this 28-ton tank were its low silhouette and its unusually broad treads. The Russians constructed their tanks for the Russian terrain, usually a sandy soil which turns to deep mire after a rain. This gave them an additional advantage.

The production of T-34s increased greatly in 1942 in spite of the difficulties occasioned by the German advance. While the battle was raging around Stalingrad, one of the tank factories in the city produced from 10 to 15 tanks per day. The Germans, operating far from their bases and nearly 350 miles from their factories, were not able to replace the losses suffered in the continuous tank battles. Their 20-ton, medium-heavy tanks (Panzer II and IV), with speeds of slightly over 18 mph, were outclassed. This produced a harmful effect on the morale of the German troops at a critical time.

At the beginning of 1943, the Germans introduced a 60-ton Tiger tank with 100-mm armor on the front and an 88-mm gun. It created havoc with the lightly armed and armored English and American tanks in the difficult terrain of Sicily, and in Italy and Normandy. But in the great expanses of Russia, the Tiger, with its relatively low speed, was more handicapped in its combat with the fast T-34. The German soldiers referred to the Tiger, ironically, as the "furniture van."

In 1944, the Russians introduced their new tank, the Stalin, with 150-mm armor on the front and a 122-mm gun. It was built still lower than the T-34. Only by tactical skill were the Germans able to combat the greatly superior Stalin tank, which up to the very end of the war continued to be the world's mightiest tank.

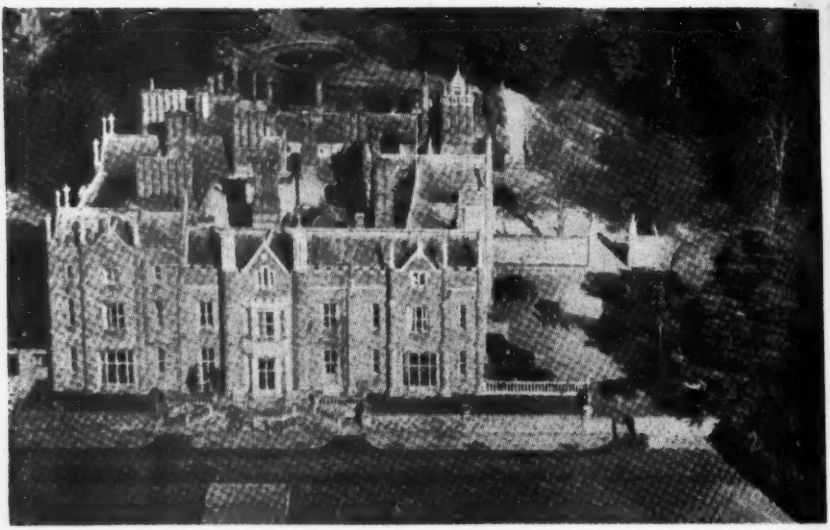
The British Joint Services Staff College

Digested by the MILITARY REVIEW from an article in "The Royal Air Force Quarterly" (Great Britain) April 1949.

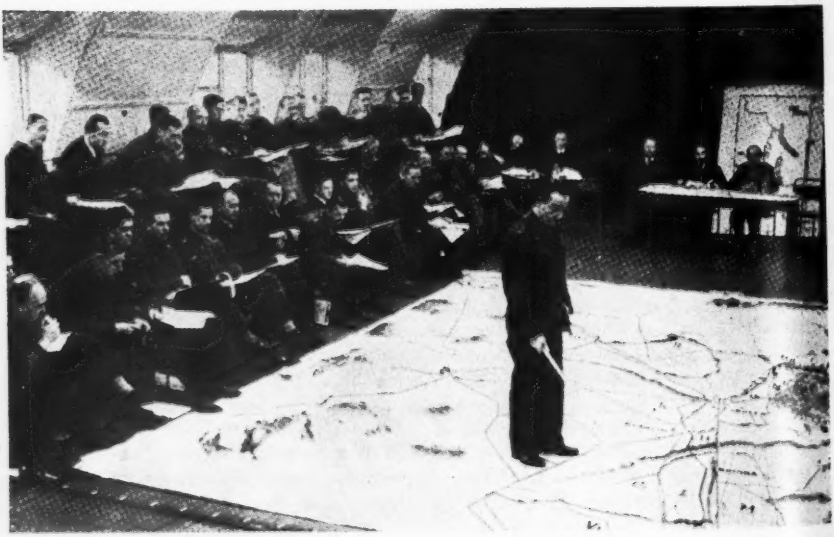
WAR and strategy have ceased to be the business of any one service operating in a single element. There are air operations, land/air operations, sea/air operations, and joint operations involving all three elements. All demand in one degree or another the exact coordination of the techniques of war and their appropriate weapons in the three elements. In fact, the division of services by elements has become increasingly a matter of administrative convenience. What cannot be allowed is a resurgence of those obstructive antipathies between the various branches of the fighting services which blotted our otherwise magnificent will to fight in the early days of the last war. They were the gospels of anarchy and ignorance.

Not only must we achieve that precise coordination from which we can make the best use of all our fighting potential, but today we are faced on a grander scale than ever before with the problems of coordinating the resources of our own Commonwealth of Nations, the nations of Western Union, and the powers which are being brought together under the Atlantic Pact. If we are to avoid the confusion of Babel, we must insure a common basis of understanding in our deliberations, a cohesive organization, and the best arrangements for the pooling of our vast resources. Western civilization and the security of perhaps many generations hereafter depends upon it.

In 1941, a young RAF officer was in-



Britain's Joint Services Staff College was established after World War II to train officers of the three services for duty on joint staffs, to develop mutual understanding and common doctrine, and to evolve standardized staff work. Above, the Joint Services Staff College, Latimer. Below, a demonstration in the model room at the College.



vited to address the Army Staff College at Haifa. He remarked upon the absurdity of a single service institution for the study of war when no operation was not at least a two-service and very often a three-service problem. The Commander in Chief took up the sentiment and there has since been a growing consciousness of the pressing need for the integration of service training and doctrine. After the war, the Naval member of the Chiefs of Staff Committee proposed that a joint services staff college should be established. With the approval of the Chiefs of Staff, Admiral Douglas-Pennant was appointed the first Commandant of the Joint Services Staff College (JSSC) and was asked to prepare his own directive.

The Charter of the JSSC, as confirmed by the Chiefs of Staff, is:

". . . to train officers who are already qualified in the staff work of their own service, for staff appointments in joint staffs, and in so doing to improve their qualifications for higher staff appointments in their own services; to develop mutual understanding and a common doctrine between services, and to evolve a standardized system of staff work."

Attention is focused upon principles and higher staff work rather than upon details. The syllabus of instruction includes the study of the following:

1. The organization and capabilities of the three services, their relationships with each other and with the other government departments.

2. The planning and execution of all types of joint operations with special reference to the administrative aspects.

3. The broad administrative aspects of joint operations of all types.

4. Imperial strategy, including the governmental machinery for the central direction of war, the system of higher command and cooperation with the Commonwealth countries and the United States.

5. The broad problems of war production, modern production methods, economics and allocation of manpower, and their relation to the fighting services.

6. The influence of scientific progress upon strategy and tactics.

The course lasts for 6 months. The class of just under 100 students is drawn from all services of the United Kingdom, the Commonwealth forces, and from the Civil Service.

The JSSC, like the Imperial Defence College, is under the Ministry of Defence. The Commandant is of rear-admiral, major general, or air vice-marshal rank, and the intention is that the appointment will be rotated. There are three senior members of the directing staff—a naval captain, a colonel, and a group captain. Beneath these there are five directing staff members from each service. The latter form five directing staff joint teams for the preparation and conduct of exercises and problems. Each of these officers is also responsible for the work of a group of seven or eight students of all categories.

Methods of studying the problems of war vary from lectures to demonstrations, discussions, written exercises, plays, films, visits, and private study. Each subject is studied jointly and there is frank discussion to get to the bottom of all problems. Prejudice and the blind acceptance of single service doctrines soon wither. On the other hand, it is in no way the intention to make officers of one service interchangeable with those of another. It is a college through which all serious aspirants to high staff and command appointments should undoubtedly pass.

General Staff Work in Occupied Enemy Territory

Digested by the MILITARY REVIEW from an article by Lieutenant Colonel R. B. Muir in "The Army Quarterly" (Great Britain) July 1949.

CERTAIN aspects of general staff work in occupied enemy territory may be of interest, either because they are peculiar to the occupational role, or because the conditions of occupation require them to be viewed from an unusual angle.

Operations—General

Normally, in occupation tasks, the "fog" of war is practically non-existent, the imponderables are fewer and less formidable, and the demands of the time factor are less exacting. Hence, planning can be all the more thorough, and within the limitations of security, conditions at rehearsals can be all the more efficiently simulated. From a purely military point of view, the failure of an operation is consequently all the more reprehensible.

As always, political considerations will dictate strategy. On the other hand, the implementation of that strategy cannot be regarded as the sole prerogative of the military commander. The political aspect may wield a considerable influence on local tactics, and it may demand the evolution of unusual methods of fighting. It is essential that the military execution of a plan be synchronized in detail with political policy, and this can best be effected by joint military government and service staffs participating in the planning.

Our democratic way of life demands unrestricted facilities for the press on every possible occasion. When, by affording these facilities, the efficiency of the operation is sometimes prejudiced, it may be difficult for the soldier to realize that this principle is to his ultimate advantage. The formulation of methods of access, control, and protection of press representatives may monopolize a considerable proportion of the time and energy of the planning staff, particularly if the operation assumes world-wide publicity. The facilities for press access and photography must be rigidly defined in each case, both to press representatives and the troops. Effective liaison by public relations staff officers will contribute to cordial relationships with press representatives.

Police should not be employed as paramilitary units, but should be given separate, well-defined, responsibilities. Suitable employment for civil police are as follows:

1. Anti-sabotage measures at vital points previous to the operation, and during the operation when these are located outside the operational area.

2. Forming outer cordons around affected areas during operations.

3. Taking over, from military collection centers, arrestees and contraband, seized by troops in the course of the operation.

4. Individually acting as guides, identifiers, or interpreters for troop parties.

Internal Security

Responsibility for the maintenance of law and order is vested normally in the local senior civil authority, who, in occupied territory, is the regional commissioner. If a situation arises which the regional commissioner considers he cannot control, he will request the military commander to assume this responsibility. When no such request is made, and the military commander appreciates that further delay in invoking military aid may prejudice future action in restoring the situation, he must make representation to the regional commissioner, reporting the circumstances to superior military headquarters. In a grave civil emergency, it is incumbent on any military officer to initiate military intervention, if required, on his own authority. He should be pre-

pared to justify his action at a subsequent inquiry. Whenever practicable, requests to assume responsibility for law and order, and for military assistance of any description, should emanate from the highest civil level, to insure that the interests of the general situation are not subordinated to local expediency.

The method and degree of search required must be defined clearly in the orders. The aim should be to cause the minimum damage to property and inconvenience to the inhabitants consistent with the efficacy of the search. Where possible, a responsible inhabitant in the area under search should accompany each search party and a certificate obtained from him on conclusion to the effect that he has no complaints with the method of conduct of the search. Any complaints should be investigated on the spot. The plan should insure that each sector is effectively screened off as the search is completed.

A drill should be practiced for the accurate and timely reporting of all incidents which may affect the internal situation—these include:

1. Acts of sabotage.
2. Thefts or interference with arms, ammunition, explosives, or other vital military equipment.
3. Incitement to create unrest.
4. Assaults on allied personnel or property.
5. Assaults by allied personnel on local inhabitants.
6. Demonstrations and strikes.

Frontier Procedure

Control of an international frontier is vested normally in the civil authorities. It is exercised by setting up, in conjunction with the adjacent international power, official crossing points, where through traffic is checked in and cleared. Crossing the frontier elsewhere by personnel or vehicles is prohibited, and the effectiveness of this restriction depends both upon the type of terrain and the vigilance of the respective frontier police forces. If the situation demands that the military exercise frontier control, this can be undertaken by patrolling from firm bases. If through traffic continues, the number of official crossing points, and the hours of their daily operation, can be restricted according to the situation and facilities available for clearance. The temporary sealing of selected frontier areas, without warning, will prove a deterrent to illegal crossings.

For authorized crossings, a system of standard documents or passes will be agreed upon with the adjacent power. Notification of intended journeys may have to be given in advance. A convenient method of clearing journeys is through the military attaché in the country to be visited. If preferential treatment in frontier procedure is accorded to military personnel, it is advisable to institute a check point for military traffic close to the official crossing point, and this can be manned by military police.

Guards and Escorts

The provision of troops for guard and escort duties may impose a considerable strain on units already overloaded with manpower commitments. As a general principle, troops should not be employed on duties which can be undertaken equally well by civil police or watchmen. Economies in manpower can be effected by:

1. Use of wire obstacles, but this will not be effective unless the entire perimeter is under observation both day and night, necessitating local floodlighting or trip alarms.
2. Employment of war dogs, a most effective method of combating pilferage. Dog handlers must be properly trained, and at least two handlers per dog will be required.
3. Reciprocal arrangements with flanking formations, thus enabling overlapping

commitments to be pooled to mutual advantage.

Security

A high standard of security is a prerequisite to the success of practically every operation, either in peace or war. The state of security-mindedness in the individual is a transient protection rather like an inoculation. The vaccine loses its effect if not renewed periodically by reinoculation in the form of reminders designed to have maximum psychological appeal.

It is important to insure that intensification of security measures does not compromise security, and that these dovetail in with the cover plan.

Intelligence

Military intelligence can be regarded as a highly specialized art of liaison. Its object is to gain accurate and timely information. This can best be served by a well-developed, acquisitive, and appreciative sense of the potential sources of information. This liaison should include personal contact at all staff levels with:

1. Intelligence staffs of higher, flanking, and subordinate headquarters.

2. Intelligence staffs of local naval and air headquarters.

3. Intelligence staffs of Military Government, e.g., in Rhine Army, Intelligence Divisions.

4. Special Investigation Branch, Military Police.

5. Special Branch of the Civil Police.

The intelligence staff should be selected with due regard to the individual's native qualities of reliability, sense of proportion, initiative, and determination. Additional essential attributes are a methodical and analytical mind and the ability to speak and write impartially.

Emphasis must be laid on the necessity for sending individual intelligence staff members to courses. The maximum possible number of vacancies should be accepted on graded courses at Army Intelligence Schools, for both intelligence staff and potential intelligence personnel. Local courses should also be organized and run by personnel who have qualified suitably in Army courses.

The prevalence of rumors may afford worthwhile material for the intelligence staff. The plausibility of such rumors increases their potentialities, when manipulated by troublemakers well skilled in this technique.

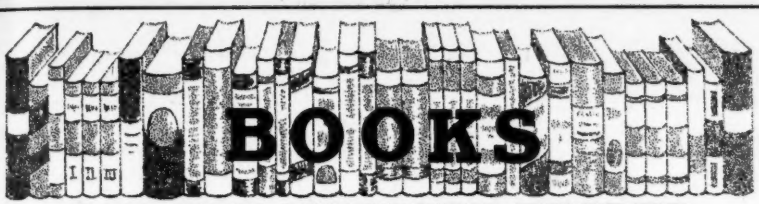
Disarmament

In an occupied territory, part of the onus for eventual disarmament will devolve on the Army, in general, and the general staff branch, in particular. Disarmament officers on the general staff of the formation, in conjunction with demolition staff officers of the Royal Engineers, work in close cooperation with the disarmament staff of Military Government. Army responsibilities will comprise:

1. Definition of war potential of buildings and installations.

2. Inspection of disarmament targets after demilitarization.

Military Government will bear the overall responsibility for execution of demilitarization of targets, and the extent to which the Army will contribute to this program will depend largely on the engineer resources available. The delethalization and disposal of battlefield scrap can be carried out by enemy ammunition disposal units, under technical direction of Ordnance.



FOR THE MILITARY READER

WAR AND PEACE AIMS OF THE UNITED NATIONS. From Casablanca to Tokio Bay, 1 January 1943—1 September 1945. Compiled and edited by Louise W. Holborn. 1200 Pages. World Peace Foundation, Boston. $6.00.

The first volume under this title was issued in 1943. It was a collection of documents and speeches showing the Allied efforts to define the nature of World War II and the order of postwar society. The present volume now carries the documentation on through the San Francisco Conference and the defeat of the Axis powers in 1945. Most of the documentation is from United States, British, British Dominions, Russian, and United Nations sources. Fifty-two pages pertain to the American republics.

A SHORT HISTORY OF THE MIDDLE EAST. From the Rise of Islam to Modern Times. By George E. Kirk. 289 Pages. Public Affairs Press, Washington, D. C. $3.75.

In the modern conception, and as treated in this history, the Middle East comprises the Arabian Peninsula and the Arabic-speaking lands on its northern border; the Arabic-speaking lands of Northeast Africa (Egypt, Anglo-Egyptian Sudan, Cyrenaica, and Tripolitania); Asia Minor; and Iran. The first six chapters of the book bring the history of the area up to World War II. The succeeding chapters deal with the war and postwar years, current economic and social conditions, Russia and the Middle East, and the Western Powers and the Middle East.

THE WAR OF 1812. By Francis F. Beirne. 392 Pages. E. P. Dutton & Company, Inc., New York. $5.00.

The reader will find in this new history of the War of 1812 a complete account of both the land and naval actions of this early American war. But one of the main features of the book is its treatment of the national and international setting in which the war took place and the thesis that the war was unnecessary. The inadequacy of American preparations is underscored. In the Navy, younger officers with experience against the Barbary pirates swept the seas and the Great Lakes. On land, the few Regular Army officers who had not seen action since the Revolution, the small scattered garrisons, and the untrained militia, met only disaster until 1814, when the tide turned under the influence of younger men like Andrew Jackson, Izard, Totten, and Macomb.

THE BOOK OF THE GARAND. By Major General Julian S. Hatcher. 277 Pages. Infantry Journal Press, Washington, D. C. $6.00.

A complete history of the development of the Garand M1 rifle, as well as the story of the long search for a military semiautomatic rifle, may be found in this volume. Besides the purely historical record of the development of the Garand, there is a detailed section on its operation. One chapter deals with the performance of the rifle in World War II.

STRATEGIC INTELLIGENCE. By Sherman Kent. 206 Pages. Princeton University Press, Princeton, N. J. $3.00.

As considered by this author, intelligence is the knowledge which "our highly placed civilians and military men must have to safeguard the national welfare." At the same time, strategic intelligence is seen as an extension of the search for useful knowledge. The "extensions" which the author visualizes in strategic intelligence are: that the knowledge sought is vital for national survival; that it involves long-range speculation by experts; that its investigations assume a clandestine nature; and that it is a large-scale job, performed by groups and involving a division of labor. The author divides his book into three major parts. First, he considers intelligence as a kind of knowledge. Second, he looks at intelligence as a type of organization which produces knowledge; in this section, he takes up the organizational and administrative problems of central and departmental intelligence. Third, he examines intelligence as the activity pursued by an intelligence organization, covering what intelligence work involves and the problems peculiar to it.

THE CORAL SEA. By Alan Villiers. 289 Pages. Whittlesey House, McGraw-Hill Book Company, Inc., New York and Toronto. $4.00.

This is a geographical study of the area northeast of the Australian Continent which suddenly assumed such vital importance in the early part of the war in the Pacific. The author, an Australian, describes the various lands bordering the Coral Sea, tells about the people occupying them, and gives the story of the various nationalities that have been a part of its history. One chapter deals with the Coral Sea in World War II.

A SPECIAL STUDY OF OPERATION "VITTLES." By Aviation Operations Magazine. 120 Pages, New York.
BERLIN AIRLIFT. An Account of the British Contribution. 63 Pages. British Information Services, New York.

These two publications on the Berlin Airlift are by no means a definitive treatment of the subject, but they are suggestive of the magnitude of the project and of what can be accomplished by joint and combined operations. *Operation Vittles* is primarily the story of the United States efforts to supply Berlin by air through the Russian blockade, and *Berlin Airlift* parallels it with the story of the British contribution. Both publications are profusely illustrated with scenes of the operation, charts, graphs, and diagrams. Scarcely any mention is made in either work of the ground and naval support which also played an important part in the operation.

A SHORT HISTORY OF RUSSIA. By B. H. Sumner. 433 Pages. Reynal & Hitchcock, New York. $5.00.

According to this author, there are seven basic influences that have shaped the development of Russia. Instead of attempting the usual chronological history, he develops these influences topically. The seven factors, which form the main part of the book, are: the frontier, the form of the state, the land, the church, the Slavic people, the sea, and the impact of the West.

ADAM TO ATOM. By Dr. Roger Shaw. 59 Pages. The Society of American Military Engineers, Washington, D. C. $1.50.

This is a short account of military history from the earliest times through World War II. A section entitled "Mars Takes Steps" is a tabulation of important dates in military history. The text of this work appeared previously in serial form in *The Military Engineer.*